

MARCH 2002
ISSUE #496
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73 Amateur Radio Today

Esoteric

Math Dept.:

- Switched Mode P.S.
- Contrawound
Toroidal Helix

Review:

- MFJ Antenna

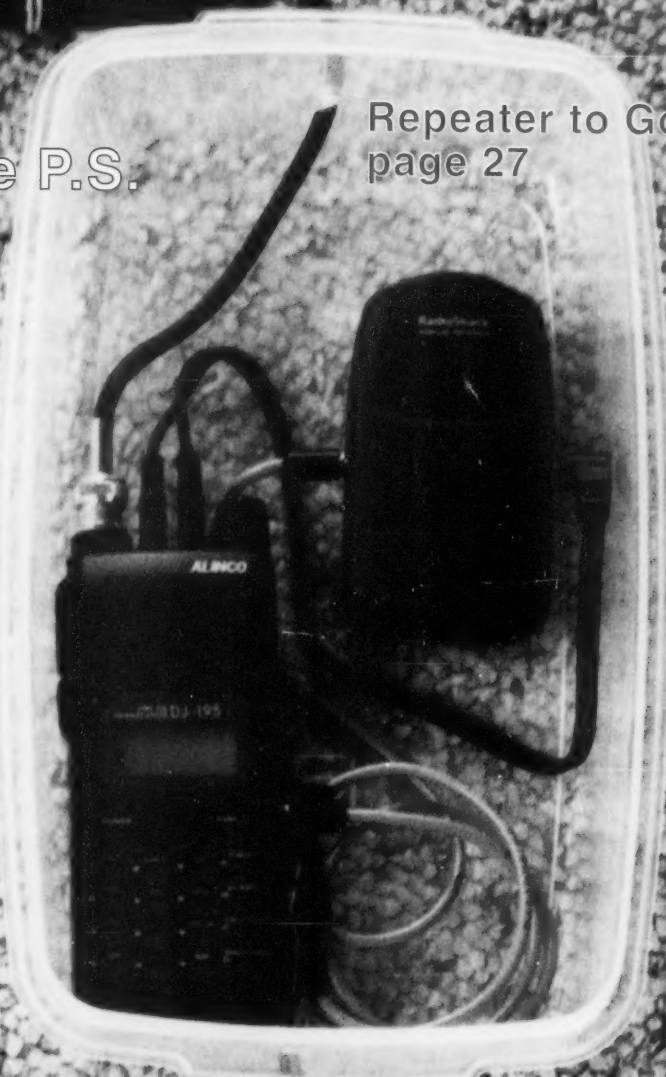
Build the
Vent-a-Fume

T-Hunting
in Gatorland

QRP:
Inside the HW-7

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Repeater to Go
page 27



*****3-DIGIT 481
#00000191981MR9# JUL76 147
UNIV MICROFILM 45
SERIAL PRNG ATTNL P 1
300 N ZEEB RD
ANN ARBOR MI 48103-1553

Alinco's New HTs

Fun, Fantastic and Affordable!

Check out the new DJ-596 dual bander or the DJ-196/496 monoband units. No matter which you choose, you'll get a transceiver that's rugged, easy to program and built for years of dependable operation. You expect more value from Alinco and we deliver!

DJ-596T VHF/UHF Dual-band HT **NEW!**

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- 100 memories in any combination of VHF or UHF channels
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- Each memory capable of "odd split" operation.
- Alphanumeric channel labels
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- Accepts 6 ~ 16 VDC direct input
- Three scan modes
- Illuminated keys and display
- Wide and narrow FM modes
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DJ-196T (2m) and DJ-496T (440 MHz)

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- 5 watts DJ-196 /
4 watts DJ-496
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- 40 memory channels
- Keypad frequency input
- CTCSS and DCS encode+decode
- Alphanumeric display
- 13.8 VDC direct input
- Wide and narrow FM modes
- Illuminated keys and display
- Autodial memories
- S-meter
- DJ-196 TX 144 ~ 148MHz;
RX 135 ~ 174 MHz
- DJ-496 TX 430 ~ 450 MHz
RX 430 ~ 450 MHz



Great Accessories for Alinco and other radios!

Iron Horse antennas and accessories extend the use of your transceivers and scanners. BNC connections make it easy to take your HT mobile for BIG signals in and out!



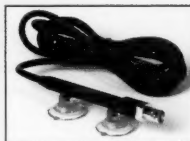
IHC 19 car window mount
BNC connectors, window mount, sets up in just seconds!

IHMM270 Compact VHF/UHF Magnetic Mount Antenna

BNC connector, 9 feet of RG-174 cable and a powerful magnet. Less than 20 inches high, SWR less than 1.5:1 throughout either band. Max power: 50w/VHF; 25w UHF.

IHC 20 glass suction-cup mount

Extension BNC suction mount keeps your antenna inside but against the glass for a true "window on the world." For mobile or base use, includes 6 feet of RG-58U cable.



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BNC connector, just 13.5 inches high. Powerful rare-earth magnet, 9 feet of RG-174 cable. Receives 100 ~ 1200 MHz, can transmit on 2m, 70cm and SMR frequencies.

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*Digital communications require at least two similarly equipped transceivers.

Digital mode is compatible with Alinco DR-135/235/435T mobile transceivers equipped with EJ-43U digital communications board.

Digital mode may not be legal in some countries. See FAQ on digital at www.alinco.com.

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REVIEW

- 33 **MFJ's 1899T Portable Antenna — K7UGO**
Great for the Yaesu FT-817 or any other QRP rig ...

QRX . .

How Far Down Does This Thing Go? or, Not Really Sure I Wanted to See THAT!

The world of medical communications research has finally caught up with the lights of Hollywood. This, as the government approves a tiny radio camera-in-a-capsule that patients can swallow. It is a camera that

will transmit pictures to give doctors a close-up view of what is inside of you.

The new transmitting video pill is made by Given Imaging Ltd. in Israel. Called the M2A Swallowable Imaging Capsule, it is exceedingly tiny. In fact, it is so small that it is easily swallowed by the patient.

Its inventors say that it then painlessly winds its way through the digestive tract and uses wireless

Continued on page 6

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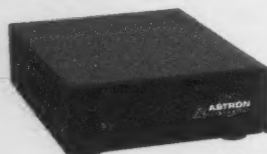
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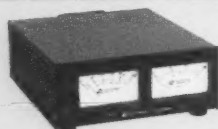
MODEL SS-10TK



MODEL SS-12IF



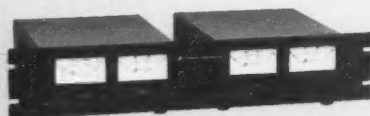
MODEL SS-18



MODEL SS-25M



MODEL SRM-30



MODEL SRM-30M-2



MODEL SS-12SM/GTX



MODEL SS-10EFJ-98

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- FUSE PROTECTION
- OVER TEMPERATURE SHUTDOWN

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| MODEL | CONT. (Amps) | ICS | SIZE (inches) | Wt.(lbs.) |
|-------|--------------|-----|-------------------|-----------|
| SS-10 | 7 | 10 | 1 1/2 x 6 x 9 | 3.2 |
| SS-12 | 10 | 12 | 1 1/2 x 6 x 9 | 3.4 |
| SS-18 | 15 | 18 | 1 1/2 x 6 x 9 | 3.6 |
| SS-25 | 20 | 25 | 2 1/2 x 7 x 9 1/2 | 4.2 |
| SS-30 | 25 | 30 | 3 1/2 x 7 x 9 1/2 | 5.0 |

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

| MODEL | CONT. (Amps) | ICS | SIZE (inches) | Wt.(lbs.) |
|---------|--------------|-----|-------------------|-----------|
| SS-25M* | 20 | 25 | 2 1/2 x 7 x 9 1/2 | 4.2 |
| SS-30M* | 25 | 30 | 3 1/2 x 7 x 9 1/2 | 5.0 |

RACKMOUNT SWITCHING POWER SUPPLIES

| MODEL | CONT. (Amps) | ICS | SIZE (inches) | Wt.(lbs.) |
|--------|--------------|-----|--------------------|-----------|
| SRM-25 | 20 | 25 | 3 1/2 x 19 x 9 1/2 | 6.5 |
| SRM-30 | 25 | 30 | 3 1/2 x 19 x 9 1/2 | 7.0 |

WITH SEPARATE VOLT & AMP METERS

| MODEL | CONT. (Amps) | ICS | SIZE (inches) | Wt.(lbs.) |
|---------|--------------|-----|--------------------|-----------|
| SRM-25M | 20 | 25 | 3 1/2 x 19 x 9 1/2 | 6.5 |
| SRM-30M | 25 | 30 | 3 1/2 x 19 x 9 1/2 | 7.0 |

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

| MODEL | CONT. (Amps) | ICS | SIZE (inches) | Wt.(lbs.) |
|----------|--------------|-----|--------------------|-----------|
| SRM-25-2 | 20 | 25 | 3 1/2 x 19 x 9 1/2 | 10.5 |
| SRM-30-2 | 25 | 30 | 3 1/2 x 19 x 9 1/2 | 11.0 |

WITH SEPARATE VOLT & AMP METERS

| MODEL | CONT. (Amps) | ICS | SIZE (inches) | Wt.(lbs.) |
|-----------|--------------|-----|--------------------|-----------|
| SRM-25M-2 | 20 | 25 | 3 1/2 x 19 x 9 1/2 | 10.5 |
| SRM-30M-2 | 25 | 30 | 3 1/2 x 19 x 9 1/2 | 11.0 |

CUSTOM POWER SUPPLIES FOR RADIOS BELOW

EF JOHNSON AVENGER GX-MC41
EF JOHNSON AVENGER GX-MC42
EF JOHNSON GT-ML81
EF JOHNSON GT-ML83
EF JOHNSON 9800 SERIES
GE MARC SERIES
GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
UNIDEN SMH1525, SMU4525
VERTEX — FTL-1011, FT-1011, FT-2011, FT-7011

NEW SWITCHING MODELS

SS-10GX, SS-12GX
SS-18GX
SS-12EFJ
SS-18EFJ
SS-10-EFJ-98, SS-12-EFJ-98, SS-18-EFJ-98
SS-12MC
SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V



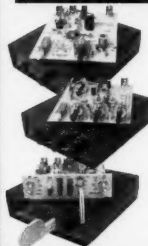
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QRP TRANSMITTER

Available in 20, 30, or 40 Meters, these neat little transmitters put out 1 Watt!

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Available in 20, 30, or 40 Meters, 1.0 uV sensitivity rivals the big rigs...at a fraction of the price!

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With adjustable pitch & speed from 3-60 wpm, features true iambic keying and EPROM memory!

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35 WATT LPFM STEREO TRANSMITTER

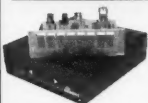


- ✓ 35W RF output, VSWR protected
- ✓ Automatic audio & power controls
- ✓ Digital synthesized PLL
- ✓ Full front panel control
- ✓ 110/220VAC, 12VDC operation

Whether your application is export or LPFM, the PX1 has you covered. From the over-rated continuous duty power supply & power amplifier to the 2 line vacuum fluorescent display, your station will be the easiest to setup and the most reliable for continuous operation. Full microprocessor controls provide a "virtual engineer". Check out www.highpowerfm for full details.

PX1 35W Professional FM Stereo Transmitter \$1,795.95

TOUCH-TONE TONE GRABBER



- ✓ New-built-in RJ11 phone jack
 - ✓ Large memory holds over 500 numbers
 - ✓ Big bold 8 digit display, auto insertion of dashes
 - ✓ New-output latch jack
- Dialed phone numbers on the radio, repeater codes, control codes, anywhere touch-tones are used, you can read and store them!

All new design for 2002. Capture those tones with the TG2!

TG2 Tone Grabber Tone Reader Kit \$59.95
CTG2 Matching Case & Knob Set \$14.95
AC125 110 VAC Power Adapter \$9.95

ELECTROCARDIOGRAM HEART MONITOR



- ✓ Visible and audible display of your heart rhythm
 - ✓ Re-usable sensors included; just like visiting the hospital!
 - ✓ Bright LED "beat" indicator
 - ✓ Monitor output for oscilloscope display
- Enjoy learning about the inner workings of the heart while covering the stage by stage electronic circuit theory of ECG/EKG systems. Be heart smart and learn at the same time!

ECG1 Electrocardiogram Heart Monitor Kit \$34.95
CECG Matching Case & Knob Set \$14.95
AC125 110 VAC Power Adapter \$9.95
ECGP10 Replacement Reusable Probe Patches (10-Pack) \$7.95

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- ✓ Connect consumer outputs to XLR inputs
 - ✓ Left & right audio gain adjustments
- So you're trying to connect consumer audio outputs with RCA connectors (unbalanced) to XLR (balanced) inputs. Always a problem...Not anymore with the R2XL1!

R2XL1 Unbalanced to Balanced Audio Converter Kit \$49.95
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PROFESSIONAL FM STEREO RADIO STATION



- ✓ Synthesized 88 to 108 MHz with no drift!
- ✓ Built-in mixer - 2 line inputs and one microphone input!
- ✓ High power module available for export use
- ✓ Low pass filter for great audio response

Our FM100 is used all over the world by serious hobbyists as well as churches, drive-in theaters, and schools. Frequency synthesized PLL assures drift-free operation with simple front panel frequency selection. Built-in audio mixer features LED bargraph meters to make setting audio a breeze. The kit includes metal case, whip antenna and built-in 110 volt AC power supply.

FM100 Super-Pro FM Stereo Radio Station Kit \$249.95
FM100WT 1 Watt, Wired Export Version \$399.95

SYNTHESIZED FM STEREO TRANSMITTER



- ✓ All new design & features for 2002!
 - ✓ Fully adjustable RF output
- Our #1 kit for years has just gotten better for 2002! Totally redesigned, the FM25B has all the features you've asked for. From variable RF output, F connector RF output jack, line input, loop output, and more.

Includes case, power supply, whip antenna, audio cables.

FM25B Synthesized FM Stereo Transmitter Kit \$129.95

AUTOMATIC COLOR/BW IR CAMERA



- ✓ Color during the day, IR B&W at night!
 - ✓ Automatically turns on IR illumination!
 - ✓ Waterproof to IP57 standards!
 - ✓ Black anodized housing with universal mount
- Best of both worlds! This video camera is a waterproof COLOR camera during the day. When the light level drops, it automatically changes to B&W and turns on its built-in IR illumination, with 10 IR LEDs. Powered by 12VDC and terminated with a professional BNC connector. B&W only model also available if color is not needed.

Both in heavy anodized black housing.

CCD309 Color/B&W IR Waterproof Bullet Camera \$169.95
CCD308 B&W IR Waterproof Bullet Camera \$109.95
AC125 110 VAC Power Adapter \$9.95

MINI B&W CAMERA WITH IR ILLUMINATION



- ✓ Built in IR illumination!
 - ✓ Sees in total darkness!
- What a deal! This miniature B&W video camera has 6 high power IR LEDs built into it to provide illumination in total darkness! No need for external IR illuminators. Attractive black aluminum housing easily mounts at any angle with the built-in swivel bracket. Runs on 12VDC, and includes professional BNC output plug-in harness.

CCD303 Mini B&W IR Illuminated Camera \$59.95
AC125 110 VAC Power Adapter \$9.95

Check out all our other new cameras at www.ramseykits.com



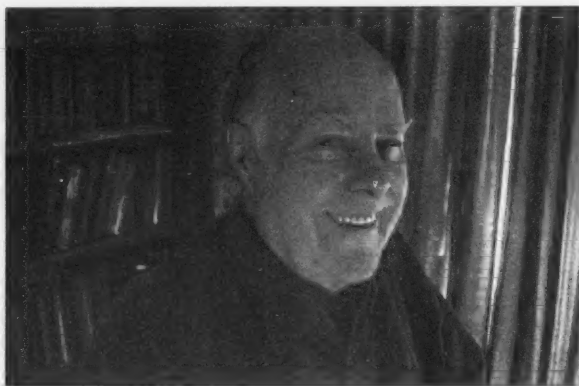
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Upsizing America

With Ford laying off 35,000 workers and many other industry giants massively downsizing, as we hear every day on the news, it's time to start upsizing our workforce. In the long run, the shock of being downsized may be the wake-up call that millions of workers need to get them to start thinking in terms of starting their own businesses.

Small business to the rescue. We need to encourage the starting and growth of small businesses. And, by small business, I'm not talking about more mom and pop stores or restaurants, I mean manufacturing or sales companies for niche products.

In my *Improving State Governments* book, I go into detail on how any town can set up a business incubator to help new businesses get started. I recommend that the state establish a fund which these incubators can use, guaranteeing that the state can't lose on the deal.

In my *Secret Guide to Wealth* book, I explain how anyone of any age can learn what they need to know to start and run their own business, with someone else being delighted to pay them to learn.

There are a lot of things you need to know to run your own business, and it can be very expensive to learn the ropes on your own money. This is why 90% of small businesses fail within five years. However, if you know what you're doing, your business isn't likely to fail.

In the book, *Rich Dad*,

Poor Dad, the rich dad has his own business and the poor dad is a college professor. The book is reviewed on page 40 of my *Wisdom Guide*.

When I'm driving to the airport to go somewhere, I feel such pity for the long lines of daily commuters. Commuters driving to and from jobs, often for an hour each way. Hey, I did that 50 years ago, driving between my home in Brooklyn and Airborne Instrument Labs in Mineola, Long Island. Or taking the subway to Atlantic Avenue in Brooklyn and then the Long Island Railroad out to Mineola. The subway and train ride at least gave me an opportunity to read. Been there, done commuting. Ugh.

The real strength of our country isn't IBM and U.S. Steel, it's the millions of small businesses. Few people make much money working for our giant industries.

I started publishing 73 in 1960. The magazine has never made a lot of money, but it's allowed me to live comfortably, and to work at something which is so much fun that it should be illegal. It's allowed me to travel the world, and to spin off stuff like *Byte*, a bunch more magazines, newsletters, a ton of books, and several tons of CDs. If you'd been a music lover all your life, how would you like to be the publisher of the country's largest music magazine? Wow! Talk about fun!

So what's stopping you?

Do They, Still?

When I was in high school

in Brooklyn we boys were lined up in the gym a couple times a year and "inspected." We had to drop our pants and underwear, bend over and part our buttocks for hemorrhoid inspection. I'll bet they aren't still doing that.

In the navy, we had regular short-arm inspection. I wonder if our 21st-century navy is still doing that?

Reading

The old adage is: "The person who doesn't read is no better off than someone who can't read."

When I read that our school-teachers read an average of one book a year, and that's a novel, I think of that adage. When I visit people's homes and see no bookshelves, I don't think much of them. My home is so full of books that it's getting difficult to find a place for more six-foot book cases. There are six in my office, ten in my bedroom, 17 in the upstairs hall, 24 in what was a guest room, and 37 in what was a rec room. Oh, there are six more bookcases of books in the barn, plus about 30 cartons of 'em — and I can find any book I want in short order.

I try not to miss any library book sales within easy driving distance (two hardcover books for a buck). I look for interesting books at yard sales (three to five for a dollar), and have found a bunch. The people at the Nashua Barnes and Noble know me well. Then, some wonderful books turn up at the Hancock town dump in the "take it or leave it" shed. Free. I should

be using the Web more to shop for book bargains.

I've read a few novels, but over 99% of my books are nonfiction.

The cream of the crop are reviewed in my *Secret Guide to Wisdom*. I welcome any suggestions from readers on books "I'm crazy if I don't read."

The best brains in the world are available to me through their books. What better teachers could I find in any university?

How do I find time to read so many books? That's easy — I don't have any interest in watching sports. I don't care to watch millionaires playing with balls. I enjoy doing things, not watching others do them. Always have. I also don't watch soap operas, dysfunctional families on the court shows, or the survival shows. And what little TV I do watch is usually while I'm fixing and eating a meal.

Dammit!

Congress has done it to us again! They recently voted in a \$26.5 billion education bill. No, there was nothing in there about improving the public school system, which has been producing the least-educated kids in the developed world.

But the part that has me in an uproar is their quadrupling of the money devoted to bilingual education.

It's bad enough that the poorest Mexicans are moving up here at the rate of about 500,000 a year, and that the Los Angeles area will soon

Continued on page 8

Big Savings on Radio Scanners

Uniden® NEW!



Bearcat® 780XLT Trunk Tracker III

Mfg. suggested list price \$529.95

Less - \$190 Instant Rebate / Special \$339.95

500 Channels • 10 banks • CTCSS/DCS • S Meter

Size: 7 5/8" Wide x 6 15/16" Deep x 2 3/16" High

Frequency Coverage: 25,000-512,000 MHz., 806,000-823,987.5 MHz., 849,012.5-868,987.5 MHz., 894,012.5-1,300,000 MHz.

The Bearcat 780XLT has 500 channels and the widest frequency coverage of any Bearcat scanner ever. Packed with features such as Trunktracker III to cover EDACS, Motorola and EF Johnson systems, control channel only mode to allow you to automatically trunk certain systems by simply programming the control channel, S.A.M.E. weather alert, full-frequency display & backlit controls, built-in CTCSS/DCS to assign analog and digital subaudible tone codes to a specific frequency in memory, PC Control with RS232 port, Beep Alert, Record function, VFO control, menu-driven design, total channel control and much more. Our CEI package deal includes telescopic antenna, AC adapter, cigarette lighter cord, DC cord, mobile mounting bracket with screws, owner's manual, trunking frequency guide and one-year limited Uniden factory warranty. For maximum scanning enjoyment, order magnetic mount antenna part number ANTMMBNC for \$29.95; The BC780XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. For fastest delivery, order on-line at www.usascan.com.

Bearcat® 895XLT Trunk Tracker

Mfg. suggested list price \$499.95

Less - \$320 Instant Rebate / Special \$179.95

300 Channels • 10 banks • Built-in CTCSS • S Meter

Size: 10 1/2" Wide x 7 1/2" Deep x 3 3/8" High

Frequency Coverage: 29,000-54,000 MHz., 108,000-174 MHz., 216,000-512,000 MHz., 806,000-823,987.5 MHz., 849,012.5-868,987.5 MHz., 894,012.5-956,000 MHz.

The Bearcat 895XLT is superb for intercepting trunked communications transmissions with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include Auto Store - Automatically stores all active frequencies within the specified bank(s). Auto Recording - Lets you record channel activity from the scanner onto a tape recorder. CTCSS Tone Board (Continuous Tone Control Squelch System) allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, order the following optional accessories: PS001 Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter \$14.95; PS002 DC power cord - enables permanent operation from your vehicle's fuse box \$14.95; MB001 Mobile mounting bracket \$14.95; EX711 External speaker with mounting bracket & 10 feet of cable with plug attached \$19.95. The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS or LTR systems.



SCANNERS

Bearcat® 245XLT Trunk Tracker II

Mfg. suggested list price \$429.95/CEI price \$189.95

300 Channels • 10 banks • Trunk Scan and Scan Lists Trunk Lockout • Trunk Delay • Cloning Capability 10 Priority Channels • Programmed Service Search

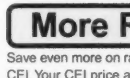
Size: 2 1/2" Wide x 1 3/4" Deep x 6" High

Frequency Coverage:

29,000-54,000 MHz., 108-174 MHz., 406-512 MHz., 806-823,987.5 MHz., 849,012.5-868,987.5 MHz., 894,012.5-956,000 MHz.

Our Bearcat TrunkTracker BC245XLT, is the world's first scanner designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS and EDACS® analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. Our scanner offers many new benefits such as Multi-Track - Track more than one trunking system at a time and scan conventional and trunked systems at the same time. 300 Channels - Program one frequency into each channel. 12 Bands, 10 Banks - Includes 12 bands, with Aircraft and 800 MHz. 10 banks with 30 channels each are useful for storing similar frequencies to maintain faster scanning cycles or for storing all the frequencies of a trunked system. Smart Scanner - Automatically program your BC245XLT with all the frequencies and trunking talk groups for your local area by accessing the Bearcat national database with your PC. If you do not have a PC simply use an external modem. Turbo Search - Increases the search speed to 300 steps per second when monitoring frequency bands with 5 KHz. steps. 10 Priority Channels - You can assign one priority channel in each bank. Assigning a priority channel allows you to keep track of activity on your most important channels while monitoring other channels for transmissions. Preprogrammed Service (SVC) Search - Allows you to toggle through preprogrammed police, fire/emergency, railroad, aircraft, marine, and weather frequencies. Unique Data Skip - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies.

Memory Backup - If the battery completely discharges or if power is disconnected, the frequencies programmed in your scanner are retained in memory. Manual Channel Access - Go directly to any channel. LCD Back Light - An LCD light remains on for 15 seconds when the back light key is pressed. Autolight - Automatically turns the backlight on when your scanner stops on a transmission. Battery Save - In manual mode, the BC245XLT automatically reduces its power requirements to extend the battery's charge. Attenuator - Reduces the signal strength to help prevent signal overload. The BC245XLT also works as a conventional scanner. Now it's easy to continuously monitor many radio conversations even though the message is switching frequencies. The BC245XLT comes with AC adapter, one rechargeable long life ni-cad battery pack, belt clip, flexible rubber antenna, earphone, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, ESAS or LTR systems. Hear more action on your radio scanner today. Order on-line at www.usascan.com for quick delivery.



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| Bearcat 278CLT 100 ch. AM/FM/SAME WX alert scanner..... | \$159.95 |
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Frequency Coverage:

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WFM, NFM, SPM (Super Narrow FM), WAM, AM, NAM (wide, standard, narrow AM), USB, LSB & CW. Super narrow FM plus Wide and Narrow AM in addition to the standard modes. The AR8200 also has a versatile multi-function band scope with save trace facility, twin frequency readout with bar signal meter, battery save feature with battery low legend, separate controls for volume and squelch, arrow four way side rocker with separate main tuning dial, configurable keypad beep/illumination and LCD contrast, write protect and keypad lock, programmable scan and search including LINK, FREE, DELAY, AUDIO, LEVEL, MODE, computer socket fitted for control, clone and record, Flash-ROM no battery required memory, true carrier re-insertion in SSB modes, RF preselection of mid VHF bands. Detachable MW bar aerial. Tuning steps are programmable in multiples of 50 Hz in all modes, 8.33 KHz airband step correctly supported. Step-adjust, frequency offset, AFC, Noise limited & attenuator, Wide and Narrow AM in addition to the standard modes. For maximum scanning pleasure, you can add one of the following optional slot cards to this scanner: CT8200 CTCSS squelch & search decoder \$89.95; EM8200 External 4,000 channel backup memory, 160 search banks, \$69.95; RU8200 about 20 seconds chip based recording and playback \$69.95; TE8200 256 step tone eliminator \$59.95. In addition, two leads are available for use with the option socket. CB8200 PC control lead with CD Rom programming software \$109.95; CR8200 tape recording lead \$59.95. Includes 4 1,000 mAh AA ni-cad batteries, charger, cigar lead, whip aerial, MW bar antenna, belt hook, strap and one year limited AOR warranty. Enter your order now at <http://www.usascan.com>.

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continued from page 1

technology to transmit full color pictures to a belt pack receiver worn by the patient. That unit also decodes the signal and records the information as the patient goes about his or her daily routine.

A U.S. spokesman for Given Imaging says that doctors who wish to use the video imaging pill will have to buy a specialized \$20,000 computer workstation. Each camera capsule costs about \$450.

The entire system is reminiscent of the science fiction movie *Fantastic Voyage*. In that film, a submarine and its crew of medical specialists are miniaturized and injected into the bloodstream of a critically injured man to perform an operation to save his life while receiving instructions by two-way radio.

Or, you could just rent *Osmosis Jones*.

Thanks to Mert Garlick N6AWE and Science Today, via Newsline, Bill Pasternak WA6ITF, editor.

DX Riddle-o'-the-Month

Name the largest island in the world before the discovery of Australia. (Answer at end.)

Does Your Bread Land Jelly-Side-Down??

The Basic Rules of Ham Life:

1. Mobile antennas fail in the first 100 miles of a 1,000-mile trip.
2. Manuals mysteriously disappear just before you want to sell a radio.
3. Sellers always have whatever you want back at the shop.
4. Rotors fail on contest day at 2 a.m.
5. As a seller, you never arrive early enough at the hamfest for a cool shady spot.
6. You never have the correct-value replacement fuse.
7. Battery chargers are always left at home.
8. CW is never slow enough to copy at Field Day.
9. No two Atlas 210s work the same.
10. Under "stupidity" in the dictionary is a photo of a ham who just soldered a PL-259 with the fitting nut laying on the table.
11. You always find that other lost gizmo while you're looking for the first lost gizmo.
12. The old accessories for your HT or mobile are never compatible with your new HT or mobile.
13. Elements of antennas that need to be adjusted are always just beyond your reach from the top of the tower.
14. Women and children grasp CW faster than the OM.
15. The polarity of the radio's power cord connector of the unit you want to demo is always wired the opposite of the one you have with you.

Thanks to WCRA's Stray RF, via Mike Herman KC9NF, via Squelch Tale, newsletter of the Chicago FM Club, September 1999.

Casper SK?

Are cell phones killing ghosts?

No, we are not kidding you. In fact, Tony Cornell, of the Society for Psychical Research, has told the London *Sunday Express* that reports of ghost sightings started to decline when mobile phones were introduced 15 years ago.

According to Cornell, ghost sightings had remained consistent for centuries. In fact, until three years ago, the society had received one or two new ghost sighting reports every week. But with the introduction of mobile phones 15 years ago, ghost sightings began to decline to the point that the society is not receiving any.

And why are there no longer any ghosts being observed? Apparently paranormal events, which many scientists attribute to unusual electrical activity, may be drowned out by the electronic noise produced by cellular telephones and text messaging pager transmitters. And according to the newspaper, the lack of ghost sightings could adversely impact on the nation's economy. It says that haunted tourist attractions in Britain could be under threat if the number of cell phones continues to grow from the present figure of about 39 million now in use in the U.K.

And all of this begs that one question be asked: If ghosts are the spirits of the dead, how can anything actually kill them?

Thanks to Don Wilbanks KC5MFA and Science Today, via Newsline, Bill Pasternak WA6ITF, editor.

Random Access Humor

For sale: parachute, used once, never opened, small stain.

Why did the Howells pack so much for a three-hour tour?

Make headlines! Use a corduroy pillow!

... collect call from Earth, will you accept?

Confusion not only reigns, it pours ...

If at first you don't succeed, redefine success.

Speak the truth, but leave the motor running.

Smith & Wesson: the original "point and click" interface.

I don't cheat, I play by the extended rules.

So easy to use, a child can do it. Child sold separately.

What part of my brilliance don't you understand?

Happiness is a state of mind. Not happy? Change your mind.

Lord, give me patience ... right now!

I am Procrastitron. I will destroy you, eventually.

When you've got no choice, be brave.

A darkroom is not the best place to develop a reputation.

If chocolate is the answer, the question is irrelevant.

Never question authority. It doesn't know either.

You got ta know when to code 'em, know when to modem ...

Smoke may indicate you have passed maximum performance.

Professor: one who talks in someone else's sleep.

Graduate of the Uncle Fester School of Party Etiquette.

You ahead, make my Danish.

Thanks to Squelch Tale, newsletter of the Chicago FM Club, September 2001.

2m Shirt Button?

In another step toward faster computers, Intel Corp. has developed two new technologies that will help the tiny transistors inside microprocessors run cooler, use less power, and operate more efficiently. The new designs complement several recent breakthroughs in building minuscule transistors that form the basis of all modern computing as they switch on and off billions of times a second.

Earlier this year, Intel unveiled transistors just 20 nanometers wide. Today's Pentium 4 has 42 million transistors, each about 180 nanometers.

For reference, a nanometer is about 10,000 times narrower than a human hair.

Is that a shirt button or your 2m rig?

Thanks to Intel via Newsline, Bill Pasternak WA6ITF, editor.

Plug -n'-Pay

If you just bought a new computer equipped with the Microsoft XP operating system, or have upgraded your old one, listen up. The Federal Bureau of Investigation says that you should take certain steps to protect yourself against hackers who might try to take advantage of major flaws that have been found in XP.

The bureau's National Infrastructure Protection Center says that in addition to installing a free software fix offered by Microsoft on the company's Web site, consumers and corporations using Windows XP should disable the product's universal plug-and-play features as well. The FBI also warned computer system administrators to actively monitor for specific types of Internet traffic that might indicate an attack was under way.

The FBI did not provide detailed instructions how to disable plug-and-play. Outside experts also caution that disabling the affected Windows XP features threatens to render unusable an entire category of high-tech devices about to go on the market. This includes a new class of computer printers that are easier to set up. But the

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same experts also acknowledge that disabling plug-and-play in XP could afford some protection against similar flaws discovered in the future.

Microsoft considers disabling plug-and-play options as being unnecessary, but the company does acknowledge that Windows XP suffers from serious problems that can let hackers steal or destroy data files across the Internet or implant their own unwanted software. The FBI says that the glitches were unusually serious because they allow hackers to seize control of all Windows XP operating system software without requiring a computer user to do anything except connect to the Internet.

Thanks to Newsline, Bill Pasternak WA6ITF, editor.

Amazing Discoveries: Circles Within a Circle

One of the most curious pure mathematical discoveries for 2001 was announced in an easy-to-read article at an incredibly long Web site URL. In brief, the article says that research has led to some remarkable geometric findings involving interrelationships between tangent circles and spheres. In other words, mysterious circles within a circle.

As one researcher put it, "Where do these numbers come from? What's going on here?"

It is not true that another responded, "And who cares?"

Find out by going to [www.sciencenews.org/20010421/bob18.asp].

Thanks to CGC Communicator, via Newsline, Bill Pasternak WA6ITF, editor.

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Ronald Kane - K9MNI

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Jerry Dixon - WA6QFC

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Jason Hulet - WIWOW

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Al Lee—WA4EWV

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Arnold Knadle—N1JX

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NEVER SAY DIE

continued from page 6

be more than 50% Hispanic. Two-thirds of the births there are to Hispanic parents.

I have no objection to people coming to America, but when they do I want them to come here to become Americans, not just displaced Mexicans. I want them to speak American, not Spanish. It's okay for immigrants to be Mexican-Americans, but their kids should be plain Americans. When immigrants come here they are supposed to be assimilated, not be an invasion force.

If immigrants want to continue to speak their native language and maintain their native customs, then why should we let them stay? We have our own language. We have our own customs. When in Rome, etc.

Success in America depends a whole lot on how you look and how you speak. Our schools are doing the kids an enormous disservice by not teaching them how to speak American. American with as little accent as possible. Let's push for assimilation. Let's get our schools to give kids a break in life and not doom them to being second-class citizens because they never learned to talk our language.

The Irish, German, Russian, and many other waves of immigrants in just one generation produced kids who were Americans, so let's not encourage (with billions of our tax dollars) Latinos to doom their children.

Ebonics? Give me a break!

Mismanagement

Polaroid is in Chapter 11 bankruptcy. The stock is down to 28¢ a share from in the \$60s just four years ago. How come their board of directors and management didn't see digital photography coming? Lordy!

Unfortunately for the thousands of employees of large companies, this blindness is more the rule than the exception. Look at the blindness of all the American car companies. Then, in came the Japanese and ran circles around the hidebound old dinosaurs.

We've watched the same thing happen to GE, RCA, and the other manufacturers of American television and electronics equipment. And cameras. And ham gear.

When the minicomputer giants ruled the computer industry 20 years ago, I sat down with the presidents of Data General, DEC, Wang, and Centronics and tried to convince them that personal computers were the future. They all said they knew the computer industry better than I did and that I was wrong. Ditto the high-ups at Prime Computer.

In 1983, I sold my five computer magazines to International Data Group, the publisher of *Computerworld*. This was ironic, because this was the publication which had for years been ridiculing personal computers at every opportunity as toys and of no interest or consequence to the computer industry. Real computers were kept in air-conditioned rooms, run by men in white coats, and cost a million dollars.

As an IDG director, I met with the other board members in Beijing, where I warned them that *Computerworld* should start admitting that personal computers were real and include the PC industry in their coverage. They didn't want to hear about it and kicked me off the board.

A few months later their major competitor, Ziff-Davis, started *PC Week*, doing exactly what I'd recommended. In a short time it was the equal of *Computerworld* in circulation and revenues. That blindness lost IDG several billion dollars.

The five magazines I sold to IDG, which had been growing in sales at 50% per year for seven years, were soon mismanaged to death by people with no vision of the future.

So I can understand what happened at Polaroid.

Today I need to buy a good digital camera. Am I considering a Kodak? Har-de-har. Should I get the latest Nikon, Olympus, or Canon? Well, my film cameras are Olympus and Nikon — mostly Nikon — so I'll probably settle for a Nikon Coolpix 995 digital camera.

Cooked Goose

Don't you pity the poor bastards who are addicted to cocaine or heroin? And those kids exhibiting the monumental stupidity of smoking, building one hell of a lifetime (though short) addiction?

Well, step up to a mirror, sucker. You're a drug addict, too, and, like all drug addicts, you won't face the obvious.

No, I'm not talking about drugs like caffeine or alcohol, I'm talking about eating cooked or processed food.

For some reason our schools (including medical schools) don't mention the work of doctors Weston, Price, Pottenger, Comby, Bieler, and Howell. I've written about all of them except Dr. Edward Howell. I even review their books in my *Wisdom Guide*.

Howell's research showed that rats fed cooked and processed food lived about two years. Those eating raw food lived about three years. In people years that's the difference between living 75 years (our current average) and 112.

Rats fed only processed food got fatter and fatter, while their brain weight went down. D'uh?

Howell reported that before Eskimos

were introduced to a cooked diet they mainly lived on raw whale and seal blubber and meat — with no heart disease, cancers, high blood pressure, and so on. They lived long, healthy lives, even without fruit and vegetables.

A study was done with hogs, where one group was fed cooked spuds and the other raw potatoes. Those eating the cooked potatoes gained weight rapidly. Those fed raw potatoes didn't get fat. Howell states, "It is impossible to get people fat on raw foods ... regardless of the calorie intake."

Now, will that be a Big Mac (do you want fries with that?), a Whopper, or another slice of pizza?

Oh, yes: I particularly want to thank the many readers who have written, thanking me for getting them to change their lifestyles to raw food and telling me of their resulting amazing weight losses and their feeling decades younger and healthier.

Icing Up

Since our media seems totally fixated on global warming, maybe you missed the report that Antarctica picked up another ten inches of snow last year. And that's the hard packed stuff. Zillions of tons of it. Some global meltdown, eh?

In a past essay I included a photo of a hundred-foot derrick in Antarctica which was almost covered in snow after just a few years.

So what? Well, three things — none good. One has to do with Antarctica not being centered over the South Pole. If you'll check the map supplement in the February 2002 *National Geographic*, you'll see that the pole is way over on the eastern part of the continent. So what? The weight of the two-mile high ice has depressed the earth beneath over 3,000 feet from its weight, and that off-center weight is exerting a steady pressure to change the position of the pole — giving some credibility to the predictions of several prophets that a sudden pole change is going to happen.

I've gone into some detail on the predictions by Nostradamus, Edgar Cayce, and other noted prophets on the coming virtual extinction of humanity. Coming soon.

Prophets-shmofets, right? Then you sure haven't been paying attention to my editorial essays where I've reviewed the books showing that precognition has been scientifically proven to be real. Read Dean Radin's *The Conscious Universe*. Read my booklet on *Dowsing*.

Another thing not good? Did you miss the wonderful article in *The New Yorker* (Jan. 7, 2002) on what they've discovered

Continued on page 59

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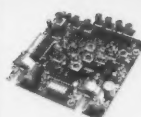
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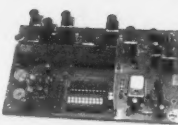
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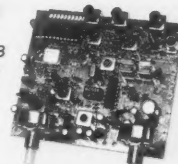
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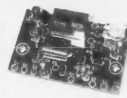
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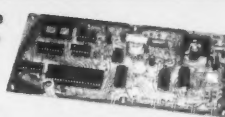
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Switched Mode Power Supplies

Get out your calculator and have some fun.

Switched mode power supplies (SMPS) are relative newcomers to the electronics world. In days gone by, motor-generators, dynamotors, or vibrator supplies were used to convert a battery voltage to some other voltage. Today SMPSes do that job. They are small, lightweight, and relatively inexpensive, and within the construction capability of the home brewer.

The power density, watts-per-cubic-inch, of newer commercial SMPSes is truly amazing. While some newer SMPSes have densities of 20 watts-per-cubic-inch, most home builders will accept a much lower power density, a larger unit, if they can build it themselves. The home-built supplies may not be the most compact, but they are still a far cry from being boat anchors.

Most conventional power supplies operate from the 60 Hz mains, and have ripple frequencies of 120 Hz. The 60 Hz transformers and chokes are big and heavy, but they are devils we know and have learned to live with. But when we need to operate from a battery, we are pretty much up the creek unless we can work with the battery voltage as it is. Of course, we can still generate 60 Hz with a motor generator

and use the 60 Hz supply, but that is like standing up to paddle a canoe — there are better ways.

Instead of generating 60 Hz, why not 60 kHz or 600 kHz? The transformers and inductors will be much smaller and the filtering much easier. Arguing against a high frequency is component availability. 60 Hz magnetics, transformers, and chokes, are commercially available, but high frequency transformers are not. High frequency transformers are small and easy to wind: A few turns on a ferrite core for an SMPS looks pretty good.

As an example, obtaining 28 volts from a 12 volt source can be achieved with a DC/DC converter: A high frequency oscillator followed by an amplifier. Then rectified and filtered. This solution is certainly simple, but it has no regulation and must be manually adjusted. SMPSes are regulated and often have a lot of other bells and whistles not essential to generating a stable voltage such as over or under voltage protection, current limiting, or soft start. Once you know what the necessary parts are and what they do you can add these extra functions.

The output of a bare bones unregulated supply changes as the main battery

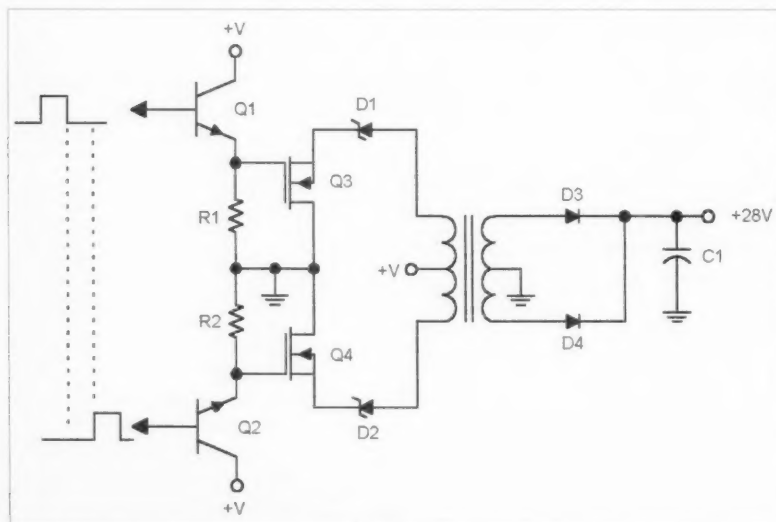


Fig.1. A push-pull amplifier is used to provide the high power output.

voltage changes or as the load changes. An unregulated supply is certainly simple, but adding regulation need not be a deal breaker. It can be as simple as following the unregulated supply with a zenor diode or a three terminal regulator. This is a rather inefficient approach. Another more complex but efficient method is to control the drive to the power oscillator. An even more complex scheme is to sense the DC output and automatically control the drive to the amplifier to maintain the desired DC output voltage. This is an SMPS.

Controlling the output power of an SMPS isn't like controlling the output of a linear amplifier. The output power is controlled by changing the duty cycle of the drive. A push-pull amplifier is shown in Fig. 1. When each transistor is on for full alternate half cycles the output will be maximum, but when each transistor is on for only a part of the half cycle, the output will be less. Changing the duty cycle of the drive is the smart way to change the output voltage.

In Fig. 2, two sections of U1 a CD4001, U1A and U1B, act as a relaxation oscillator. The leading edges of the square wave are differentiated with C2 and R3, and C3 and R4 and logic NOR'd in U1C, then inverted with U1D to produce the trigger for the monostable multivibrator U2A and U2B, another CD4001. The period of U1A and B is approximately $1/1.39R2C1$. R1 just stabilizes the frequency with changes in supply voltage. R1 can have any value but something in the range of three to ten times R2 is typical. Large values of R1 can limit the maximum frequency, so at 200 kHz a value of about three times R2 is safe.

The output of the monostable, U2A and U2B, is approximately $1/0.7C4R5$. When R5 is made variable the pulse width can be varied. The negative pulse from U2A is logic OR'd in U2C and D to control the duty cycle of the drive to the amplifier. R5 controls the DC output of the converter.

The outputs of U1A and B and the variable pulse from U2A are logic NOR'd in U2C and U2D to produce a variable width positive pulse on alternate half cycles to drive the amplifier.

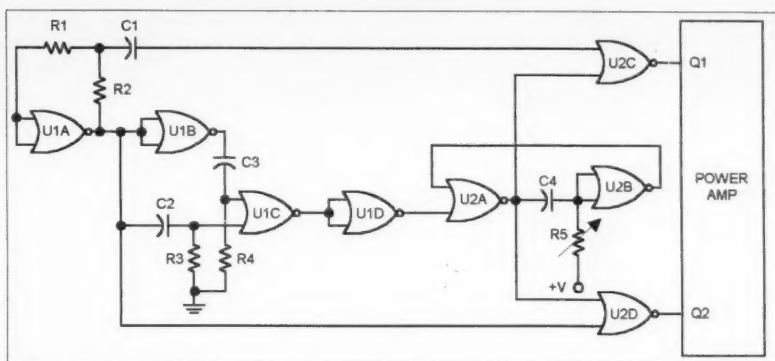


Fig. 2. A DC/DC converter can be manually adjusted.

The MOSFETs Q3 and Q4 in Fig. 1 conduct when their gates are positive: Q3 conducts on one half cycle and Q4 conducts on the next half cycle.

Operating with higher frequencies

requires consideration of parasitics that could be ignored at 60 Hz. What were trivial parasitics at 60 Hz become serious problems at 60 kHz and at 600 kHz everything is critical: Leads

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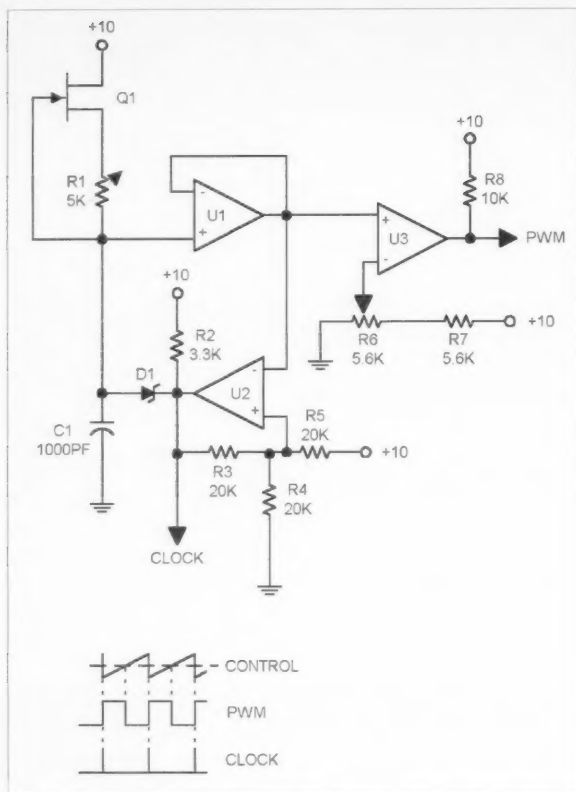


Fig. 3. A pulsewidth modulator is an essential part of an SMPS.

become inductors, capacitors and inductors are resonant circuits, the equivalent series resistance and inductance limit the effectiveness of capacitors. Reverse recovery time of diodes, and storage time of bipolar transistors add to the design problems.

Bipolar transistor problems can be

recovery time can be a significant fraction of the period of the operating frequency. Ignore reverse recovery time at your peril.

Ordinary silicon rectifiers begin to depart from the ideal at a kilohertz or so. For example, the 1N400X series of silicon rectifiers has recovery times of

avoided by using MOSFETs. Since MOSFETs are majority carrier devices, they do not suffer from recovery time, and when driven hard enough can switch in a few nanoseconds. For high frequency supplies MOSFETs are the power devices of choice.

Diode reverse recovery time is a different problem. During the reverse recovery time a diode conducts equally well in the reverse direction, not a good situation.

Reverse recovery times of diodes is short enough to be ignored at 60 Hz, but at higher frequencies reverse

charges through the diode(s) and the source. The diode's dissipation is increased and the load on the source is also much higher than expected. The ripple increases as well. All in all a bad situation.

Schottky diodes and ultra fast diodes have much shorter reverse recovery times and minimize reverse recovery problems. Schottky diodes are an excellent choice in that they have reverse recovery times of a few picoseconds and forward voltage drops of about 0.3 volts. Unfortunately Schottky diodes have a PIV (peak inverse voltage) of only about 30 or 40 volts. Ultra fast diodes have recovery times of 25 nsec or so and PIVs up to 1 kV. Using ultra fast diodes like the Motorola MUR405 or 410 provide a nice safety factor for operating frequencies of several hundred kilohertz.

The power amplifier and rectifiers are shown in **Fig. 1**. The Schottky diodes D1 and D2 block the negative swing of voltage at the drains of the MOSFETs. (MOSFETs have a parasitic diode that conducts when the drain is negative.)

While MOSFETs are voltage controlled devices, it takes time to charge their input capacitance and raise the gate voltage. The capacity at the input is not just the gate-source capacity plus the gate to drain capacity; the old bug-a-boo Miller effect gets into the act. The input capacity of an amplifier with a resistive load is:

$$C_{in} = C_{ac} + C_{ad} \times (1 + A)$$

C_{gs}^m is the gate-source capacity, C_{gd} is the gate-drain capacity, and A is the voltage gain. To complicate the matter, C_{gd} is not constant like in a vacuum tube but changes with gate to drain voltage.

MOSFET manufacturers give the input capacity in terms of the total charge needed to be charged to switch the rated drain current when the supply is the rated drain voltage. The total gate capacitance is given as Q_T . The charge of the input capacitance $Q_T = i \times t$, where i is the charging current and t is the time the charging current flows. To switch a MOSFET with a Q_T of 15 nano Coulombs in 150 nsec would require a peak gate current of 100 mA.

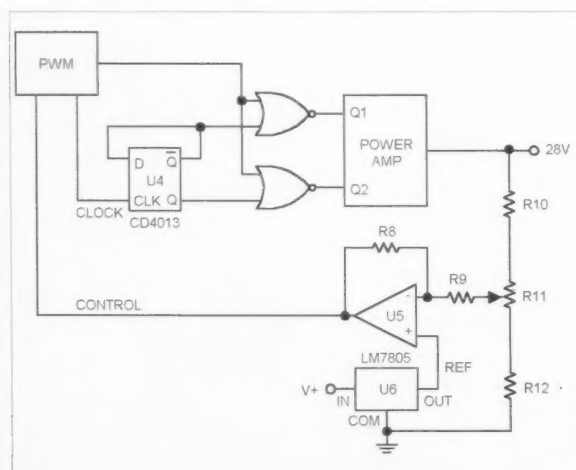


Fig. 4. A sample of the DC output can be fed back to control the output.

The gate current is a spike of current that decays exponentially to zero as the input capacitance is charged. But the peak current is still 100 mA. The output current of the CMOS gates is only a couple of mils so that more current is required to switch quickly. Emitter followers Q1 and Q2 provide the higher current. Since the emitter followers are not saturated their rise and fall times are fast. Of course, MOSFET driver ICs could be used, but 2N3904s can provide 100 mA and they are cheaper and more readily available.

The transformer is a crucial item in the design of the supply. The turns ratio of the transformer dictates the step-up or down of the main battery supply voltage V_+ . Designing the proper transformer is not a walk in the park, but it's not a deal breaker.

Selection of the wire size depends on the currents involved, and the number of turns depends on the required inductance and the step-up desired. The ampere turns dictate the core size. The turns ratio sets the step up or down of the voltage.

If the main DC source is a 12 V car battery, the voltage can vary from 9 V to 13.8 V; 9 volts is essentially a dead battery and 13.8 volts is a fully charged battery.

If it is desired to build a 28 V 1 A supply powered from a car battery, a 4:1 ratio transformer would step up 9 volts to about 36 volts peak and step up 13.8 volts to about 55 volts peak if the transformer were 100% efficient. With reasonable transformer efficiency and losses in the amplifier and rectifiers, the output should be 30 V minimum and at least 50 V maximum. A toroid will probably be easier to work with than a pot core, but compromises will have to be made. The turns ratios must be whole numbers.

Selecting a core that has the permeability and saturation characteristics is the key consideration. The impedance of the primary with the secondary open should be as large as practical, certainly greater than three times the loaded impedance. The secondary impedance reflected into the primary is the secondary impedance divided by

N^2 , the turns ratio squared, 1.75 ohms. The magnetizing impedance should be greater than 5.25 ohms, so that at 100 kHz, a primary inductance of at least 8.4 μ H is required.

A toroidal transformer wound on a core of Ferronics B material is quite suitable for frequencies up to 500 kHz. As a first cut the 11-282 core is large enough to comfortably accommodate the necessary windings, but as will be shown a single core will saturate. Two cores stacked can increase the effective area and ease that concern.

The magnetic dimensions of two stacked 11-282 cores are: $A_e = 1.044 \text{ cm}^2$ (each core has an $A_e = 0.522 \text{ cm}^2$, $l_e = 5.42 \text{ cm}$. L computes to be 12 μ H for one turn. A usable flux density is less than 3,500 Gauss in each core. For two stacked cores the flux density is 7,000 Gauss.

The inductance of a toroid is given as:

$$L = N^2 0.4 \pi \mu A_e / l_e \times 10^{-8} \text{ Henries}$$

L also can be given as the inductive index A_L .

$$\mu = B(\text{Gauss}) / H(\text{Oersteds})$$

$$H = 0.4 \pi N I_e \text{ Oersteds}$$

where:

A_e is effective area in cm^2 .

l_e is effective length in cm.

A_L is the inductance index, the inductance of one turn.

$$L = A_L N^2$$

A_L is given as 6,057 nH for the 11-282 core.

The permeability μ and maximum flux density B for B material are given in the data sheets as $\mu = 5000$ and $B = 3,500$. When two cores are stacked, A_e doubles and doubles the inductive index. Therefore a turn has an inductance $L = A_L N^2 = 12 \mu$ H or an impedance of 7.5 ohms at 100 kHz. Remember, each pass of the wire through the hole is one turn.

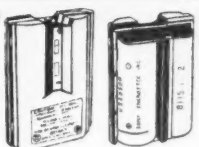
The transformer has 2 turns centertapped for the primary and 8 turns centertapped for the secondary, or a turns ratio of four to one. The secondary impedance reflected into each half of the primary is $1/N^2$ or 1.75 ohms. The magnetizing impedance of each half of the primary is $2\pi f L_p$ or 7.6 ohms. The total current in the primary is the magnetizing current plus the reflected secondary current. The maximum

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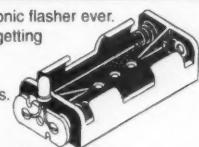
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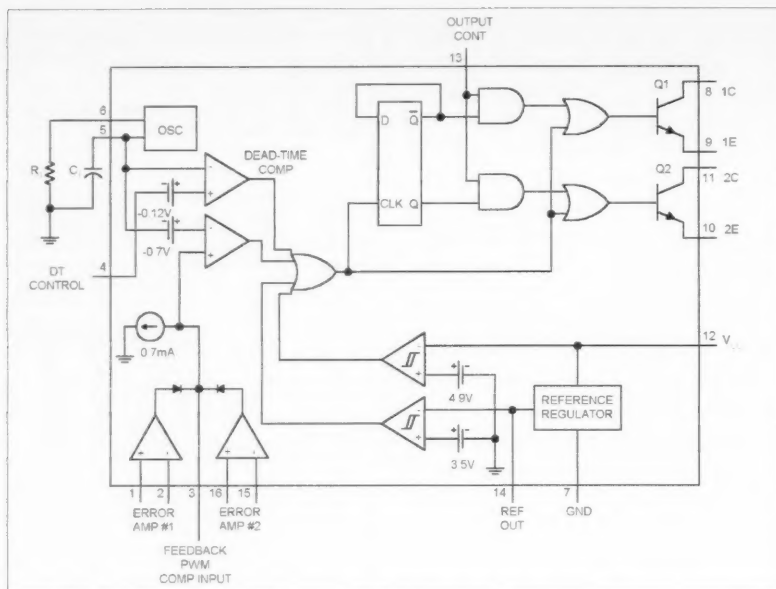


Fig. 5. The TL494 is a switch mode pulsewidth modulation control IC.

magnetizing current exists when the main battery voltage is maximum, $13.8\text{V}/7.6\Omega = 1.8\text{A}$.

The coercive force in the core is $H = 0.4\pi NI/l$ Oersteds. When the total current I is $4\text{A} + 1.8\text{A} = 5.8\text{A}$, $H = 1.3$ Oersteds. The maximum total flux B is μH or $B = 1.3 \times 5,000 = 6,500$ Gauss. With two stacked cores the flux in each core is 3,250 Gauss.

The transformer can be wound on either a ferrite potcore or a toroid core. In most cases a toroid is easier to come by and gapping the core is avoided. In either case, a good rule of thumb is to make the primary's magnetizing current, the current with the secondary open, as low as practical. That is make the inductance as high as practical. A two turn primary would have an inductance of 48 ohms but the field strength would be 2.6, which is too high.

Selecting a core is primarily a matter of finding a core that can support the needed ampere-turns without saturating the core. That is, keeping the magnetic flux (Gauss) below the saturation point of the core. The core material determines the field strength (Oersteds) that can be supported.

The wire size used depends on the RMS current the wire will be carrying. For a single layer winding the wire size should be greater than 200 circular mils

per amp. In a multi-layer winding transformer the wire size should be greater than 750 circular mils per amp. As an aside, MIL specs limit the wire size in a harness to at least 500 circular mils per amp. Therefore #18 AWG can be used for the primary and #22 AWG for the secondary. The 11-282 core has enough ID to easily allow #18 AWG to be used for both the primary and secondary. The temperature rise of #18 should be well within the temperature limits of any enameled wire, but Formvar[®] insulation is recommended and is ideal for any homebrewer's applications. Formvar may be a bit difficult to strip, but its toughness makes it a good all-purpose insulation.

A pulsewidth modulator (PWM) shown in Fig. 3 can also generate a variable pulse width to control the drive to the power amplifier. The PWM is a basic functional block of all switched mode power supplies.

The variable pulsewidth in the output of U3 of Fig. 3 is obtained by comparing a control voltage from R6 to the sawtooth output of op amp U1 in the comparator U3. Decreasing the voltage narrows the output pulse.

The sawtooth is generated by a constant current linearly charging the capacitor C1. The voltage on C1 is isolated from the following circuits by

the buffer amplifier U1. U2 is a comparator that controls the amplitude of the sawtooth. U3 compares the sawtooth voltage with a pulsewidth control voltage.

The sawtooth amplitude is determined by the hysteresis around U2. When the voltage on C1 (the output of U1) exceeds the voltage on the noninverting input of the comparator U2, the output of U2 goes to near zero and C1 is discharged through D1 toward 0.3 V, the forward drop of D1. When the voltage on C1 falls below the voltage on the inverting input, about 0.5 V, the output goes high allowing C1 to recharge and repeat the cycle. With a 10 volt supply and the values shown in Fig. 3, the sawtooth swings from about 0.5 V to 4.9 V.

The positive going output of U2 also provides the clock for U4 of Fig. 4.

The frequency of the sawtooth is determined by how rapidly the voltage on C1 rises from 0.5 V to 4.9 V. With a constant charging current, the rate of change of voltage on C1 is $dV/dt = I/C$. A charging current of 0.88 mA will change the voltage on 1,000 pF from 0.5 V to 4.9 V, a change of 4.4, in 5 microseconds, and produce a 200 kHz sawtooth.

The constant current charging C1 is obtained with Q1, a 2N5457 N-channel depletion mode JFET (a MPF102 is a fair substitute for the 2N5457). R1 controls the gate source voltage, and consequently the drain current. For the 2N5457, drain current is independent of drain voltage when drain-source voltage is a couple of volts and drain current is less than 1 mA. The gate source voltage is about 1.4 volts when drain current is 0.88 mA. Under these conditions R1 would be 1.6k.

Unfortunately, the drain current vs. gate-source voltage is not a tightly controlled parameter so a trimmer R1 is needed to set the current and frequency to a particular value. A variable R1 of 5k will probably suffice. While the value of R1 can be calculated, a more practical solution is to just adjust the source resistor to produce 0.88 mA, and forget about the analytical stuff.

If you want to do the math, an accurate prediction of the value of R1 can be made when the parameters of the

particular JFET are known. The values given in the data sheets for the 2N5457 are pretty loose: I_{DSS} , the drain current with gate-source voltage zero, is between 5 mA and 1 mA, and cutoff voltage V_{off} , the gate-source voltage that reduces the drain current to less than 1 μ A, is between 0.5 V and 6 V. The MPF102 limits are looser. Not very close, but all is not lost.

The relationship between drain current and gate voltage of a JFET can be expressed as:

$$I_D = I_{DSS}(1 - V_{gs}/V_{off})^2 \quad (\text{Eq 1})$$

where:

I_D = drain current for the particular gate voltage.

I_{DSS} = drain current with the gate-source voltage zero.

V_{off} = gate-source voltage that reduces I_D to essentially zero (less than 1 μ A).

V_{gs} = the gate-source voltage that produces I_D .

Equation 1 can be rewritten to solve for V_{gs}/V_{off} and V_{off} :

$$V_{gs}/V_{off} = 1 - \sqrt{I_D/I_{DSS}} \quad (\text{Eq 2})$$

$$V_{off} = V_{gs}/[1 - \sqrt{I_D/I_{DSS}}] \quad (\text{Eq 3})$$

The values of I_{DSS} and V_{off} can be determined with a couple of simple tests. A supply of 6 to 20 volts or so, a resistor in the order of 10k and a voltmeter and milliammeter will be needed. Connect the positive voltage to the drain and the negative side to the source. Short the gate to source of the JFET and measure the drain current I_{DSS} . Connect a 10k or so resistor in the source. Measure the voltage V_{gs} across the resistor and the resulting drain current I_D . With V_{gs} and I_D known, the value of V_{off} can be computed with equation 3. With these values of I_{DSS} and V_{off} established, the gate-source voltage needed to produce a particular drain current can be calculated with equation 1.

The drain current of a JFET is essentially independent of the drain-source

voltage when the drain-source voltage is above pinch-off. For a typical 2N5457, pinch-off is a couple of volts for drain current of less than 1 mA.

In Fig. 3, PWM is accomplished by comparing the sawtooth voltage to a variable control voltage obtained from potentiometer R6. When the sawtooth voltage on the inverting input of U3 is less positive than the voltage on the noninverting input, the output is high and stays high until the sawtooth exceeds the voltage on the inverting input. Reducing the positive voltage to the inverting input from R6 decreases the width of the positive pulse on the output of U3, and increases the width of the low.

In Fig. 4, U4, a type D flip-flop like the CD4013, is connected to divide the sawtooth period by two. In a D flip-flop, the D input is transferred to the Q output on application of a positive clock pulse. The outputs are 100 kHz square waves (200 kHz divided by 2)

Continued on page 16

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that control the outputs of the NOR gates that drive the power amplifier.

The rise of the output of U2 of the PWM provides the clock for the CD4013. Therefore, on alternate cycles of the clock (sawtooth) the low output of U4 switches from the Q output to the not-Q output.

The outputs of the NOR gates are high when both inputs are low. That is, when the output of U3 of Fig. 3 is low and one output of U4 of Fig. 4 is low, the outputs of a NOR gate is high and one of the MOSFETs is on.

The DC output can be regulated when a sample of the output is used to control the U3 instead of the voltage from the manually controlled pot R6, as shown in Fig. 4.

Feeding a sample of the output back to control the output is simple in concept, but the devil is in the details. The feedback considerations are exactly the same as those for any feedback amplifier: the feedback must be 180° out of phase with the input until the gain of the amplifier has fallen to less than one. When the voltage feedback is in phase with the input, or nearly so, the system will oscillate. Therefore care must be taken to insure that the phase of the feedback signal is always at least 150° out of phase with the input.

The operational amplifier, U5 in

Fig. 4, compares a sample of the output DC with a fixed reference DC voltage to provide the control voltage for the PWM. An increase in the output of the DC voltage causes the output of the error amplifier U5 to be less positive and narrows the PWM's positive pulse.

The feedback to the PWM forces the inverting input of U5 to be 5 volts. Therefore, adjusting R11 in Fig. 4 changes the voltage division and varies the DC output voltage. R9 minimizes the change in input resistance of U5 and consequently the gain of the amplifier as R11 is changed.

The stability of the output voltage is essentially the stability of the reference voltage and the closed loop gain of the amplifier. The gain of the error amplifier U5 is the chief determinant of regulation with changes in load. A small change in the output voltage produces a significant change in the control voltage fed back to the PWM.

In the example given, 9 to 13 volts was assumed across each half of the transformer. In reality, the voltage across the transformer depends on the kinds of transistors and blocking diodes used in the amplifier. When the transistors are MOSFETs, the losses in the drain-source resistance can be very low. In newer devices the drain-source resistance R_{DS} is as low as 30 mΩ and drops less than 0.3 V even when drain current is 10 A. When the blocking diodes are Schottkies, the total drop will be less than 0.6 V.

While common emitter bipolar transistors could be considered, their storage time tends to be long when saturated and limits the frequency that can be used. Emitter followers are fast enough because they do not saturate. Unfortunately unsaturated means their collector-emitter voltage is a volt or so. In many SMPSEs emitter followers are used and the losses accepted.

Switch mode power supply controllers are available as ICs that are reasonably priced. The ICs are very similar even though the methods of implementation may vary and some extra bells and whistles may be included. Fig. 5 shows the Motorola TL494, a basic PWM controller IC.

The TL494 has two error amplifiers, a dead band amplifier, a regulated 5 volt reference voltage, an on chip oscillator, a PWM, and two uncommitted bipolar output transistors that can supply 200 mA. Since both emitter and collector are uncommitted, the transistors can be used as either common emitter or emitter followers. All this in a 16-pin DIP. Unless you just like to build things, the IC is the way to go. Still, understanding what each of the functional blocks in the IC does will give a much better appreciation of how to apply the IC to your particular needs.

The extra error amplifier can be used to shut down the supply when there is an over current or the voltage exceeds some preset values. In the figure, pin 13 OC is the output control, a high enables the supply. The dead time controls the maximum duty cycle the power amplifier can have and is controlled by the voltage on pin 4, the minimum dead band occurs when pin 4 is grounded. The compensation network between pins 3 and 4, 33k and 0.01 μF, reduces the error amplifier gain above 3 kHz.

The internal oscillator is controlled by the R_T at pin 6 and C_T at pin 5. The oscillator frequency (twice the output switching frequency) is approximately $1/(R_T C_T)$. For an oscillator frequency of 200 kHz C_T can be 1000 pF and R_T is 5.6 kΩ.

The diodes D1 and D2 are

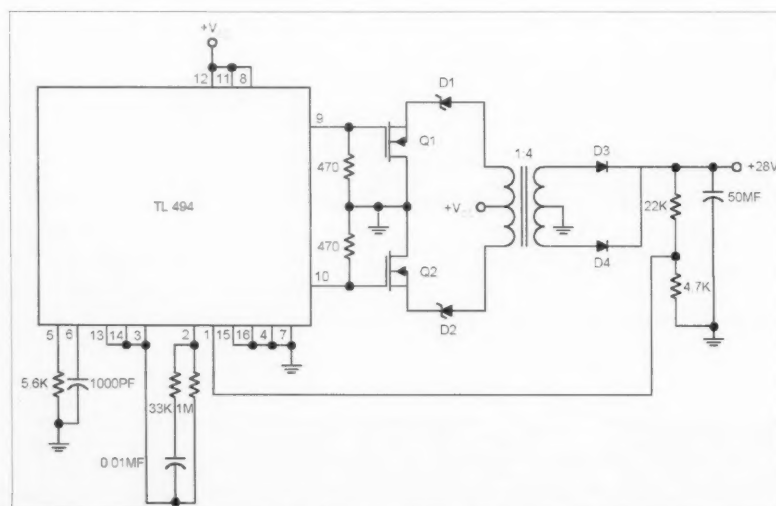


Fig. 6. A TL494 controls a 28-volt 1-amp power supply.

Vent-a-Fume

This project has produced more than its share of fans.

The weekend was here, and I had plans to spend the entire time planning and building a QRP project worthy of national acclaim! I could almost hear the DX returning my call with, "599, OM, sig FB hr QTH — (insert your own rare DX desire here)." But reality burst the bubble of dreams, when I remembered that today was the day I had promised to "clean up" all that junk in the cellar.

Gads, what an ugly thought! There's got to be the proverbial "ton" of stuff down there. We (I mostly) hate to throw things away, surely there has to be another use for most of it. And what it cost when it was new! It's like throwing away an investment! No matter that the technology has entered the "Dark Ages."

Hefting "stuff" into the trash pile was going good, until my old 286 computer surfaced. The "mental light bulb" began to glow. Hey, now there's an idea! Why not use the fan as a "ventilator" to move the soldering fumes away from the bench while building projects! It has a twelve-volt DC motor, and the power supply to operate it is the "heart" of the building project. Hot stuff! I love it when work becomes fun, and trash turns into another valuable ham radio project!

The "plan," as it were, was to create a device to remove solder fumes from the workbench area to a nearby window, where they would be released. The ventilation fan used in the computer power supply is a 12-volt DC model; a small fixed voltage supply would be required to operate it. The original supply, while functional, was

deemed "overkill" for this project. The finished product should be functional and have a "finished" appearance.

The most difficult portion of this project is locating a suitable exhaust connector and cutting the hole necessary for mounting. A trip to the local homeowner store provided a four-inch galvanized connector called a "starting collar" (\$2.90). It was found in the area serving clothes dryer tubing, etc.

The connector has "tabs" for bending on one end and allows tubing to be attached to the other.

After emptying the power supply of all parts, use the "starting collar" as a template and trace its outline on the rear panel. I used a "nibbler" to cut the four-inch hole for the collar. Next, place the fan squarely over the four-inch hole and mark the location of the four mounting holes of the fan. I

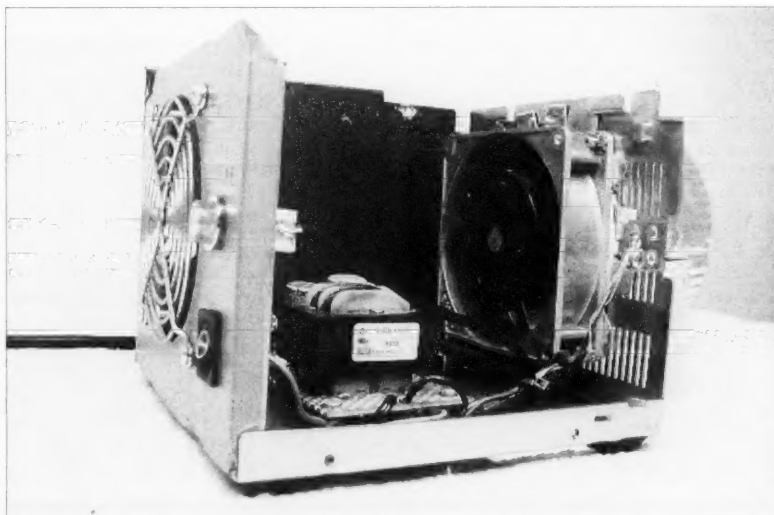


Photo A. The fan is positioned to the rear of the cabinet to facilitate optimum air flow.



Photo B. This front panel has been finished with shelf liner paper rather than paint.

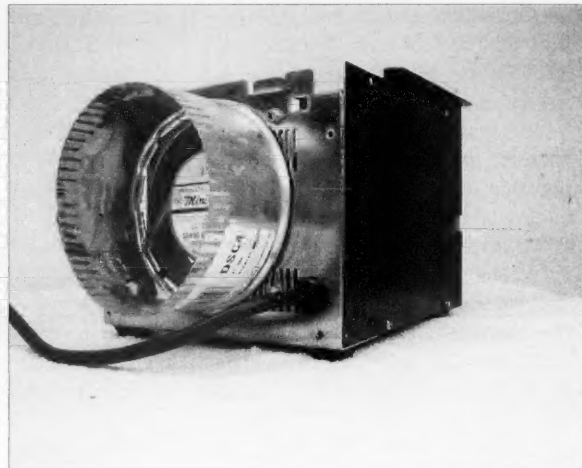


Photo C. Rear view.

moved the fan from its front location in the cabinet to the rear, to facilitate a more positive flow of air through the flex pipe and to provide cooling for the new 12-volt power source. Then I drilled the four holes to mount the fan and also drilled a suitable hole to mount the strain relief for the 115 VAC power lead (see **Photo A**).

To mount the collar, insert the tabs into the four-inch hole and bend them over. I used a small hammer to bend the tabs securely against the sheet metal housing. Before mounting the fan inside the chassis on the rear wall, check for desired rotation. The fan should "draw" air from the front to rear, and not blow air into the room. My power supply fan was mounted "off center" on the front panel, thus leaving a wide metal portion for mounting the power switch and indicator lamp.

After marking and drilling these holes, I checked for proper fit of the

switch and lamp. The front panel of my project is not painted, but has a covering of adhesive-backed "shelf liner paper" available at department stores in the housewares department. When you build this project, you can paint or apply shelf paper to the front panel as desired. The paper can be easily removed from the front "intake" hole, switch, and indicator holes using a razor knife. This is a good time to apply labeling if you desire it (see **Photo A**).

Mount the switch, AC indicator, and front wire form fan guard. The outer panels of the chassis, a flat panel and an "L"-shaped piece will be visible when assembled. I painted them with primer and Rust-Oleum Hammered Metal Finish. This paint dries to a "dimpled" finish, looks good, and is excellent for covering blemishes.

A 12-volt DC power supply to operate the fan has been described many times. A schematic for a suitable one is

shown in **Fig. 1**. All parts were salvaged from the original power supply. Your "junk box" may have to supply parts not available from your particular device. See **Fig. 1**.

Using threaded spacers, mount the new power supply, taking care to allow room for the protruding switch, indicator, and fan. Marking the location of the threaded spacers to facilitate drilling the holes is a "snap." With the spacers attached to the power supply board in their final location, paint the bottom of the spacers with red nail polish. While the polish is wet, place the board "gently" into position inside the cabinet. Remove the board, and the wet polish will have left "doughnuts" where the necessary holes are to be drilled for the screws. The polish is easily removed if desired. Attach suitable rubber feet to the bottom of the

Continued on page 58

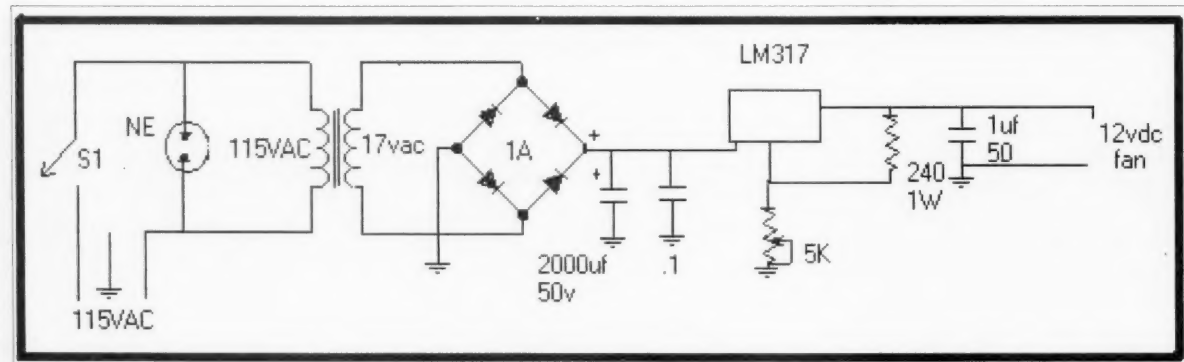


Fig. 1. 12 VDC power supply. Adjust for 12 VDC output. NE = salvaged neon indicator; S1 and bridge rectifier also salvage.

New Life for a Pierson KE-93

Part 2 of 3.

Part one of "New Life for a Pierson KE-93" discussed the power supplies that were sold as companions with the receiver during the 1957 era. All of the identified problems that I had discovered were also listed, and each will be discussed in the appropriate section as we proceed.

The objective of my involvement with this receiver project stemmed from an early fascination with Pierson receivers, even though I'd never used one. Perhaps the compact design captured my attention, since this receiver was physically different from competing receivers of the period.

Again, let me emphasize that the Pierson KE-93 ham band communication receiver was ahead of its time in

design technology and performance (see **Photos A and B**). During the early 1950s era, Standard Coil developed a turret tuner for the front end of TV sets that revolutionized the industry. Until the advent of the turret tuner, channel frequency stability and poor RF sensitivity were very common problems. Service technicians had a real battle on their hands attempting to fix TV problems — then along came the Standard

Coil turret tuner and we all sighed with relief at last.

Pierson took advantage of the Standard Coil-style TV tuner design and placed one in the front end of the KE-93 (see **Photo C**). As a result, the RF lead lengths were shortened considerably and the coil Q factor was increased, improving both RF sensitivity and input selectivity (see **Photo D**). Of course, the mechanical stability

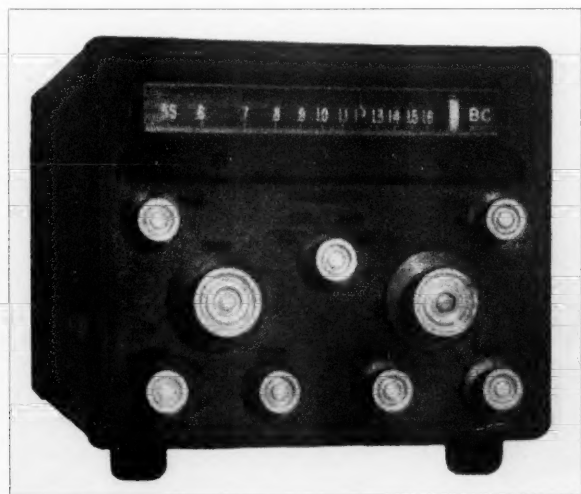


Photo A. Front panel view of the Pierson KE-93 communications receiver.



Photo B. Rear cabinet view of the receiver showing the connectors.

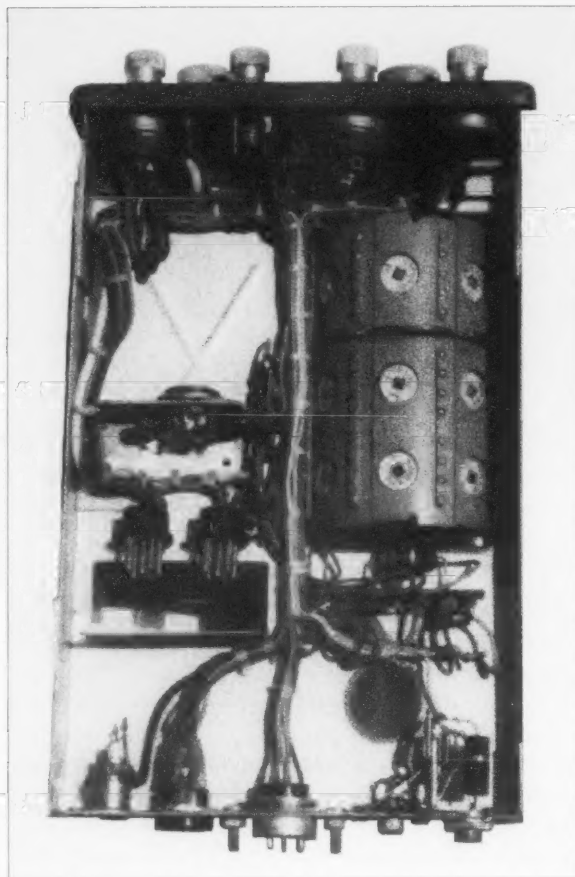


Photo C. Inside bottom view of the receiver showing the wiring harness and the coil turret.

of the front end was vastly superior to competitive receivers.

The entire IF detector, noise limiter, squelch, and audio were packaged into

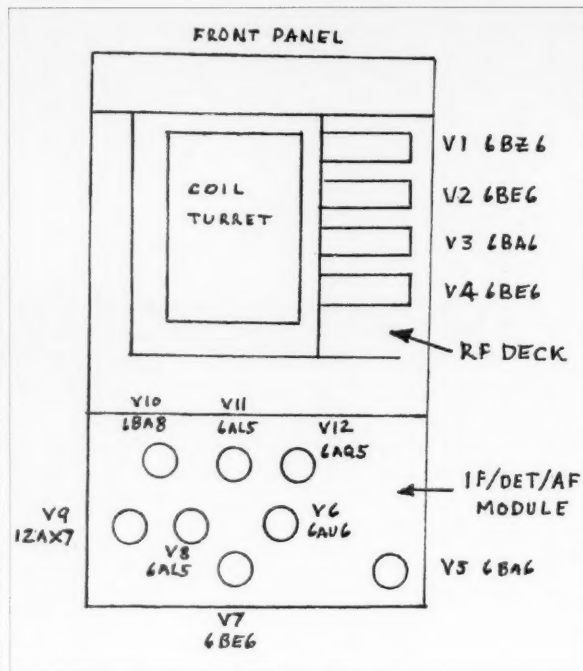


Fig. 1. General layout of the Pierson KE-93 receiver.

Another mechanical advantage engineered into the KE-93 was a partial modular design. **Fig. 1** shows the general layout of the receiver.

one small module and placed on the back porch of the receiver. When mounted, the IF system was fully RF shielded, protecting it from stray RF noises and signals.

One disadvantage of the compact design was aftermarket troubleshooting. Because of the modular design and the way things were mounted, a technician could not easily measure voltages at the socket of the IF tubes. Only the front-end tube socket pins were readily accessible for voltage measurements.

As noted in **Photo E**, all of the resistors used in the IF module are mounted on a terminal strip running the length of the chassis. Therefore, checking resistor values in the IF module is reasonably easy. Nearly all of the disc ceramic capacitors are accessible for changing should that be necessary. But to measure voltages at the tube socket pins, an independent test station with a power supply would be preferred. **Table 1** shows the resistance values that I measured at the socket pins of each tube within the receiver. Tube basing diagrams shown in **Fig. 2** provide a function reference as an aid during troubleshooting.

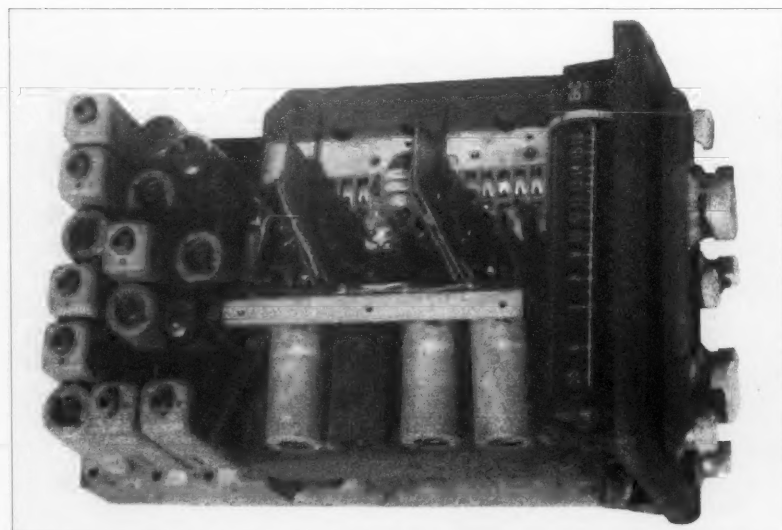


Photo D. Inside top view of the receiver showing the dial drum, coil turret connections, and compact design. Note the short lead lengths used in the front end.

Receiver

Having not previously looked inside a Pierson receiver I felt it was necessary to work up a signal path diagram, as shown in **Fig. 3**, so that I'd be able to examine and troubleshoot the receiver should repairs be required. During this part of the analysis, I discovered that the KE-93 is a double conversion receiver for the 80-10 meter bands and single conversion for broadcast and 160 meters. Conversion switching takes place by activating two microswitches with a lobe on the coil turret. Two switches are required, with one of them switching the signal from the first mixer into the second mixer or bypassing the second mixer and going straight into the IF. The second switch selects output from either the second mixer or from the first mixer.

Once I got the receiver operating, I measured the conversion frequencies and found the IF centered at 265 kHz. The crystal used in the oscillator of the second mixer operates at 2.465 MHz, causing the output from the first conversion to be 2.200 MHz. At 2.200 MHz, the image is pushed out to 4.4 MHz away from the desired input signal, reducing the amplitude of any image signal to something negligible. With the image on the high side of the input signal, it is further reduced in amplitude.

A further analysis of the IF module revealed that the noise blanker circuit is very similar to the Lamb design. During the 1950s era, noise limiters used in most ham receivers were of the series and/or shunt pulse noise gate types. Although quite effective, there was always a noise "stump" remaining after being clipped, and this residual noise stump was audible. In addition, when listening to an AM signal, some peak audio clipping took place and the user could actually hear distortion on the resulting audio signal.

Using the Lamb design, there was an increase in noise rejection as well as the elimination of all audible distortion as a function of noise blanking. Audible noise stumps were eliminated because no noise stumps are produced by the system. **Fig. 3** shows the design features of the noise blanking system

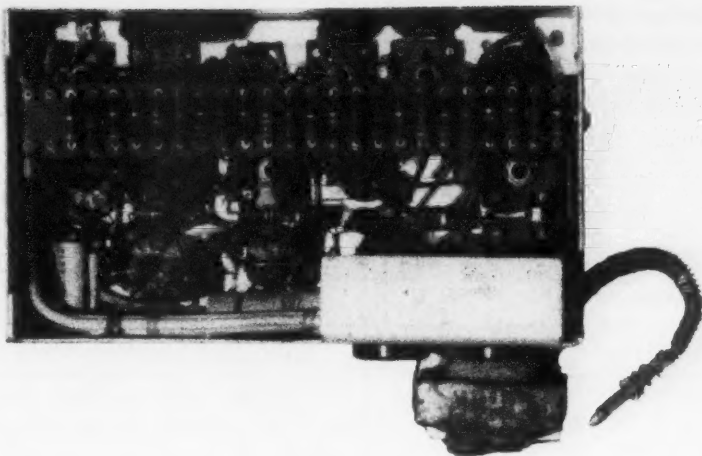


Photo E. Bottom view of the IF module showing both the compactness of the design and the availability of the resistors for troubleshooting purposes.

used in the Pierson KE-93. A tuned circuit operating at 265 kHz feeds a noise amplifier whose output is rectified to a DC voltage value. The amplitude of the DC voltage is a direct function of the noise level within the IF signal path. Once developed, the noise-generated voltage is fed into the last IF amplifier, causing an instantaneous reduction in stage gain during the noise duration period. A damper diode was added to the KE-93 circuit to prevent an overcompensation as a result of noise pulses.

Squelch was another feature designed into the KE-93. I'm not aware of any other 1950s AM ham band receiver that had squelch. Of course, it was easy to implement in the KE-93 once noise rectification was performed as it is typically done in the modern ham and commercial FM radios. White noise within the IF path decreases as a function of the received signal strength. Utilizing that feature, the derived DC noise voltage is used to control an audio gate. A pot on the front panel of the KE-93 allows the

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|-------------|-----------|------|----|---|------|------|------|-----|-----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| V1 6BZ6 | 180 | 0 | — | — | 15k | 95k | 0 | | |
| V2 6BE6 | 55k | 500 | — | — | 8k | 51k | 0 | | |
| V3 6BA6 | 17k | 0 | — | — | 9k | 32k | 0 | | |
| V4 6BE6 | 49k | 600 | — | — | 14k | 110k | ∞ | | |
| V5 6BA6 | ∞ | 0 | — | — | 65k | 38k | ∞ | | |
| V6 6AU6 | 0 | 0 | — | — | 65k | 120k | 300 | | |
| V7 6BE6 | ∞ | 1.7k | — | — | 65k | 120k | 470k | | |
| V8 6AL5 | 0 | 1M | — | — | 1.6k | 0 | 270k | | |
| V9 12AX7 | 173k | ∞ | ∞ | — | — | ∞ | 48k | 0 | — |
| V10 6BA8 | ∞ | ∞ | 1M | — | — | ∞ | 5M | 60k | 60k |
| V11 6AL5 | 1M | 470, | — | — | 0 | 0 | 470k | | |
| V12 6AQ5 | 470k | 330 | — | — | 60k | 60k | 470k | | |

Table 1. This chart shows the resistance measurements that I obtained from one receiver. Resistance values for the IF module were taken with the module removed from the receiver.

user to select the signal threshold for squelch operation.

Dial cord

After getting power applied to the receiver, I had started to perform some tests, when the dial cord jumped out of one of the pulley grooves. So what happens now! Upon examination of the situation I found the compact design was actually a hindrance to working with the dial cord. I hesitate to think of having to replace the dial cord, but decided it would be proper to prepare for the event should it occur.

Fig. 4 shows the dial cord stringing pattern that can be used as a guide should replacement become necessary.

Here is what happened: As I rotated the tuning knob from the low frequency position toward the high frequency end of the dial, the cord jumped off of one of the idler pulleys. Getting the cord back over the edge of the pulley without nicking the cord was a real challenge requiring an abundance of patience. I ended up using a pair of thin, long-nosed pliers to stretch the cord's tension spring end toward the opening on the tuning

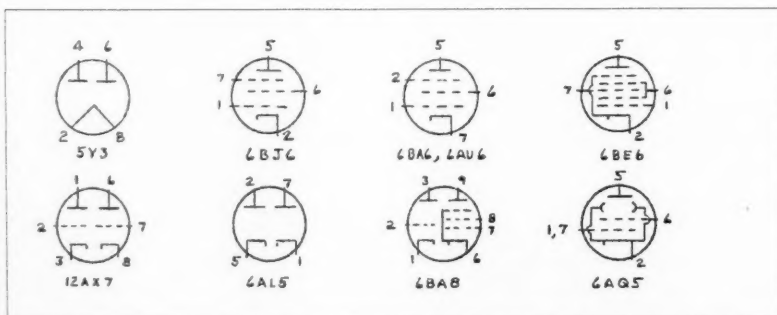


Fig. 2. Basing diagrams for all of the tubes used in the KE-93 and base power supply.

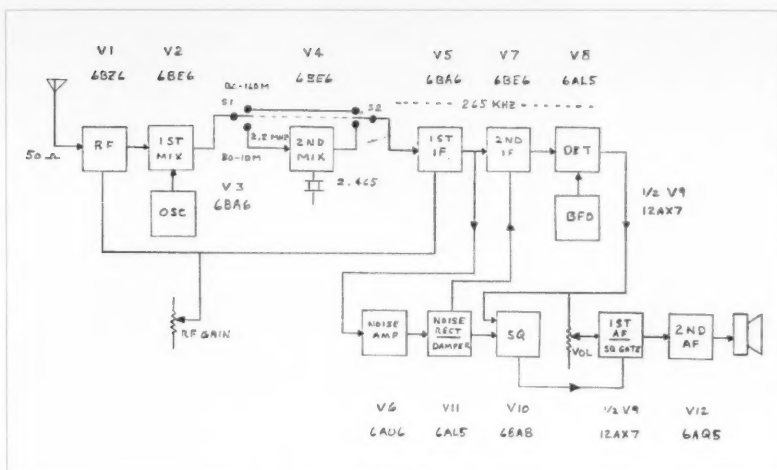


Fig. 3. Block diagram showing tube functions and the signal path for the Pierson KE-93 receiver.

drum. This action provided sufficient slack in the cord such that I eventually managed to place the cord where it belonged.

Of concern during this operation was that the spring, pulley, or dial cord should incur no damage. Holding and pulling on the cord to slide it over the edge of the pulley was pretty tricky since I had only a smooth, thin-shafted screwdriver and a round toothpick as working tools. Later, I realized that I could probably have used a paper clip stretched out with a small hook formed on one end. Hopefully I'll never have to find out if that would work.

The biggest problem was the lack of working space for the pliers, my hands, and the toothpick. It was at this point that an abundance of patience was required. There was a loud sigh of relief when the cord dropped over the edge of the pulley. But now I thought

about having to repeat the process, unless I took the necessary action to prevent it from happening again.

With the cord in place, I carefully rotated the tuning knob while watching the pulley shown with an arrow in Fig. 4. As the knob was rotated, the dial cord walked along the knob shaft away from the pulley, causing the cord to ride up and over the edge of the pulley. Of course, I stopped rotating the knob once I detected the problem situation. How to "fix" the problem was the real question. Through observation I noted that the knob shaft was badly corroded, causing the cord to stick to the shaft when some slippage would be normal. I also noted that the edge of the pulley was corroded and that the corrosion was grabbing the cord and lifting it up to the pulley's edge, allowing the cord to jump over.

The following indicates the steps that I took to alleviate the cord-jumping situation:

(1) The accumulated rust and corrosion on the knob shaft had to be removed, but the dial cord was in the way. Yet, the shaft needed to be polished without damaging the cord. To gain access to the majority of the shaft, I rotated the dial to one end of the band, allowing the dial cord to walk toward one end of the shaft and exposing nearly half of the shaft. Using a pencil eraser, I worked on the exposed corrosion until the majority was either removed or polished. Rotating the

knob shaft in the other direction walked the dial cord to the other end of the shaft, providing access to the corrosion on the other half. While rotating the knob shaft, I made sure the cord stayed within the pulley groove because I didn't care to repeat the cord stringing operation.

(2) While working on the knob shaft, I noted that the edge of the pulley was corroded and needed to be cleaned. The pencil eraser didn't seem like an appropriate tool, so I used my fingernail as a file. Rotating the knob shaft caused the pulley to rotate, allowing the edge of my fingernail to scrape along the inside edge of the pulley. Nearly all of the roughness was removed after a few minutes of that action.

(3) To reduce the tendency for rusting and to lubricate the dial cord's path, I used a small amount of beeswax. The wax was rubbed onto the knob shaft, into the pulley grooves of all pulleys, and along the dial cord where it rode in the pulleys.

The "fix" appeared to stop the tendency for the cord to ride up and over the edge of the pulley, and I've had no further trouble with the cord.

Next steps

Part one of this series examined the Pierson KE-93's companion power supplies and began the preparation for power application to the receiver. Part two continued the preparation and began addressing some of the identified problems, including the jumping dial cord. At this point in the process, the receiver was not yet operational.

Part three will continue my experience with the Pierson KE-93 receiver and the steps that were taken to make it operational. Included will be discussion on how it was tested and how well it performed. 73

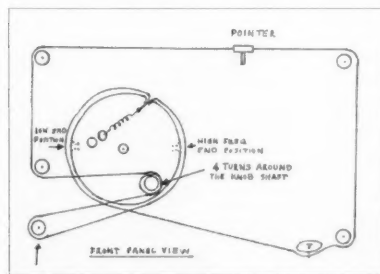


Fig. 4. Dial cord stringing diagram for the KE-93 receiver. The arrow points to the pulley most likely to cause the cord to jump.

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Travels with Henryk — Part 3

East meets West in the north.

In this sometime world of conflict and hatred, there is a secluded place north of the city of Stockholm, Sweden, where international friendship through amateur radio thrives. This place is called Kvarnberget (The Mill Hill), and on top of the hill a radio club has its site.

The callsign of the radio club is SKØUX. It is already well known in Sweden and in many other countries as a synonym for unprejudiced and boundless friendship between people of different backgrounds, nationalities, social status, and approaches to our hobby. A few of them are devoted HF contesters, while others consider anything under 1 GHz as

low frequency. Some will design multi-element arrays, while others still don't know how to build a dipole. Some will utilize the latest technology and computer techniques, while others still don't know the front from the back of a directional antenna. But there is room for everyone here.

Looking through the members' list, you'll discover people of different

ages, professions, and places of birth. Traditional Swedish tolerance and hospitality, a long history of neutrality, and verified experience in solving international disputes bear fruit in the shape of a very successful and active amateur radio club. This is a natural meetingplace for foreign hams visiting the capital of Sweden.

Though not common, this approach



Photo A. David WB6RAB/SMØXEU at the rig, with Martin OK1FMD/SMØWYB.



Photo B. WB6RAB with Pontus SM1BBI.



Photo C. Maciek SQ9DDD.



Photo F. Fabian DJ1YFK.

is not unique. At last year's World Expo in Hannover, Germany, visitors



Photo D. Waldemar SMØTQX and WB6RAB.

to the Swedish pavilion were entertained by a band of musicians coming from north and south of Sweden, North and South America, Africa, Asia, different continents, cultures, and backgrounds, yielding a rich blend of human contemporary sound. All the musicians had one thing in common: They made Sweden their home.

A joint effort in Kvarnberget by hams of various backgrounds and methods of practicing our hobby can produce a place of outstanding features and opportunities — a place that will convey hope for the future.

The photos show only a glimpse of last year's (2000) visitors and foreign members of the club using, or sometimes only admiring, the facilities. The facilities consist of a metal sheet-clad house with half a dozen operating positions, and at least 9 towers carrying a variety of radiators, all of it on a fenced half-acre lot surrounded by pine and birch. Some of the antennas

are exceptional, some are average. However, the overall standard is definitely



Photo G. Teemu SMØWKA, Jorgen MØAXP/OZ3CF/PA1CF, and Goran SMØDRD.



Photo E. SMØTQX and Roman US5WDX.

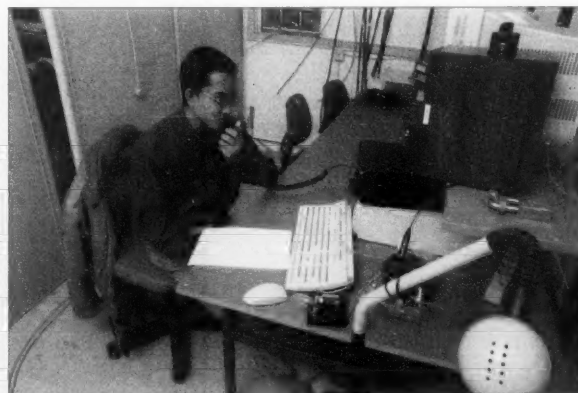


Photo H. Kamal 4S7AB.



Photo I. Carlos CX7CO and Ramon XE1KK.



Photo J. Piotr SQ5RTM, US5WDX, and SMØTQX.

higher than average, and the antennas are worth seeing with your own eyes.

One purpose of this article is to encourage anyone passing by Stockholm or its vicinity to stop and visit Kvarnberget and mingle with locals and other visitors; use the antennas to create a pileup; or just talk to your own neighborhood. Experience and practice friendship through amateur radio. The other is to open the eyes of those who limit their amateur radio engagement to owning an expensive station, exchanging 5x9, and knowing nothing about the outside world.

The world is shrinking, and I myself find it extremely enlightening to meet hams in foreign countries. I feel as though I have an advantage over the average tourist.

The most spectacular visitor to Kvarnberget I met last year was Jorge LU6AF. While in Paris, France, he took a quick flight to Stockholm. One of the club members picked him up at

the airport and drove him to the club. Jorge looked at the installations, made a few contacts with his home country of Argentina, and then off again to the airport to catch a flight back home. I guess he was impressed, but we were as well impressed by his curiosity.

The number of licensees in the world is increasing, yet very few of us can really handle the technical and experimental aspects of our hobby. We merely use the equipment and technologies developed and manufactured sometimes as by-products. Let's put them to use against the increasing international tension — let's make real friends.

Obviously, no group of people is homogeneous, so if you visit this radio club enough you are bound to meet individuals who won't say "hello" to you, who will never accept you as a fellow ham just because of the color of our skin or our native language. No society is free of such obsolete behavior

patterns. It can be annoying among hams who, by definition, experiment with radio waves in order to talk to people of different races and nationalities, people born in distant places, and the further the better. Let's hope that that old spirit of non-acceptance is a dying phenomenon.

All you peace negotiators, interracial crisis advisors, anyone with such impossible tasks — heed the guys of Kvarnberget: There is a solution.

Before coming here, check the Web page of the club at [<http://sk7do.te.hik.se/clubs/~sk0ux/>] for information on how to contact the management of the club. Welcome! 73

We pay \$CASH\$
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SEND FOR "HOW TO WRITE FOR 73"



Photo K. US5WDX.



Photo L. SQ5RTM, SMØTQX, and US5WDX.

One Repeater to Go, Please!

Another emergency tip from 73's Disaster Master.

If you have ever worked disaster recovery or damage assessment, you know how challenging conditions can become. Often travel into and out of the disaster area is limited. Loss of power means that traffic signals may be inoperative and gridlock often ensues. Once you get to the actual disaster area, roads may be impassable for vehicles, so travel throughout the area must be accomplished on foot.

While this may not seem particularly daunting in and of itself, it also means that the high-powered mobile rig with a gain antenna in your car is of little use. Ham operators assisting in these situations may be limited to hand-held radios with their inherent limited range.

In general, hobby use, handhelds perform fine because repeaters expand the area of coverage in almost all metropolitan areas. Unfortunately, disasters do not limit their occurrence to locations with good, reliable repeater coverage, so you may find yourself on the edge of repeater coverage, or a repeater may not be available.

There are some common tricks to help out in this situation — using a telescoping or 5/8-wave antenna will give better performance than a rubber duck antenna, as will a “Tiger Tail” or similar extension of the counterpoise. Gel cells mounted in a fanny or belt pack will extend operating time on high power well beyond the capacity of the handie-talkie’s internal battery packs.

Some hams may carry a small mobile rig in a shoulder pack to provide higher power, but once again, this is limited by the capacity of the battery

you are willing to carry. A larger radio and battery may not make a noticeable difference when you first start out, but over time the weight can become quite noticeable.

But even if a repeater is available and operational, what is the assurance that the repeater will be operational for as long as necessary? While many repeaters have emergency power available, the type of emergency power will determine how long the repeater can remain in service. If the repeater is able to switch from commercial electrical power to battery operation it will continue to operate for some period of time. The duty cycle of the repeater will dictate the length of time the batteries, and therefore the repeater, is available. Some repeaters can be switched into a power saving mode that eliminates all but the most basic features.

The biggest use of power will always be during transmitting, so elimination of features, while helpful, is not going to address the main problems. The more transmissions made through (and therefore by) the repeater, the faster it uses up its available power. If it is possible to drop the repeater into a lower transmitting power output without compromising required coverage, this

can play a significant role in extending its life.

Some repeaters may be located at a hospital or similar facility and may be tied into their emergency power. Hospitals often have very large generators to ensure that essential equipment such as life support can be maintained for long periods. Since hospitals play such a pivotal role during almost all disasters, the presence of a repeater is consistent with their mission and may actually prove an advantage to the hospital itself during the rescue phase of operations. But even if you are lucky enough to have a repeater which continues to operate reliably and which has coverage into the disaster areas, there may be other considerations.

If the operational repeater is the main (or only) communication link supporting the area, it can quickly become clogged with traffic from hams assisting in the operation. As hams compete for access to the repeater with a variety of critical traffic, it is not uncommon for some operators to have to resort to calling “Mayday” to break in with traffic that must be passed immediately.

The obvious answer is to bring an additional repeater into the area to operate during the disaster support

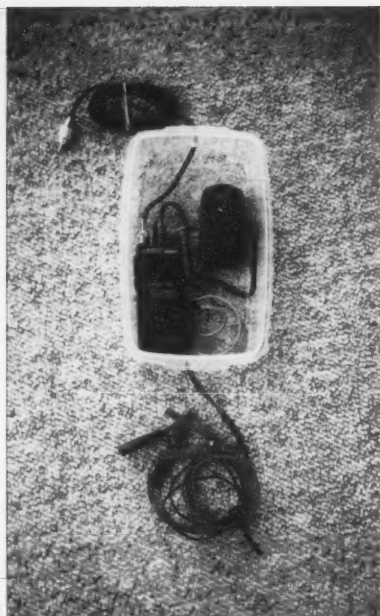


Photo A. The finished unit sits inside a plastic food container.

efforts. Now as anyone who has worked on their local ham club's repeater knows, a repeater can often involve a number of major pieces of equipment. A typical repeater may be constructed from two commercial radios, a repeater controller, power supply, duplexers, and a large antenna. Commercial radios are favored because they can be expected to provide

long, reliable service. They are normally built for durability with only minimal features.

This simplicity adds to their durability, since every horn, bell, and whistle added to a radio can make the system more prone to problems. On the other hand, commercial radios built to take a punishment are often large, with heavy protective cases.

A repeater controller may have many features and also take up a fair amount of room. It ensures that when the receiver hears a signal and the squelch opens, the other radio's transmitter is activated. The controller allows the repeater to be controlled by the repeater trustees either through a radio link on UHF, by telephone line, or by other means. It has a timer which halts retransmission after a predetermined period of time, and many repeaters include a courtesy beep which indicates that the timer has reset and it is okay to begin the next transmission.

The repeater also identifies the station at appropriate intervals and may include a phone patch to permit telephone calls to be made through a handie-talkie or mobile rig. The duplexer, which looks like two large metal cans, is a tuned cavity that permits one antenna to be used to simultaneously receive on one frequency while transmitting

on another. They stand about two-feet high, have thick walls and are not especially portable. Finally, there is the antenna, which may be ten feet tall and designed to provide coverage for a very large geographic area. Bringing a standard repeater into a disaster area is not an easy task.

Some of the newer full-featured mobile rigs have the capability of acting as a repeater. While this can provide some

help, there are two problems which must be addressed. The first is that as a mobile rig it is necessary to bring a vehicle into the area and park it in an appropriate location. Since repeaters work best when located as high as possible, this solution could work if the road into the area is clear and if there is a hill located in the area on which the vehicle can be parked. Since Murphy's Law reigns supreme in a disaster, the chances of this happening are slightly less than me purchasing a winning lottery ticket.

One of the other issues with using a mobile rig as a repeater is that most are set up to be a crossband repeater. This means that the repeater can receive on a UHF frequency such as 440 MHz and transmit on two-meter VHF or vice versa. Obviously, this means that everyone working in assistance for the area would need to be using a dual-band radio. Unfortunately, since cost is a factor for many hams, single band 2-meter handie-talkies are by far the most common rig out there.

Sometimes the best answers are the simplest. Since the earliest days of amateur radio we have used relay systems to pass messages beyond the transmitting range of a single operator. Relaying was used by primitive people on almost every continent to pass signals by smoke, banners, and other means, so adapting it to radio was a natural evolution. The American Radio Relay League takes its name from this practice when an amateur radio message would be transmitted, received, and, by retransmitting the message, relayed on to the next geographic area. The National Traffic System (NTS) and the Military Affiliate Radio System (MARS) use this technique on a daily basis.

Because there is the chance to introduce errors into a message while relaying it, various methods have been used to minimize changes in the message itself. Word counts ensure that the number of words in the text don't change. Common messages are assigned a number which is relayed from station to station along with delivery instructions. When the numbered message reaches the final receiving station, that operator converts it back into the standard

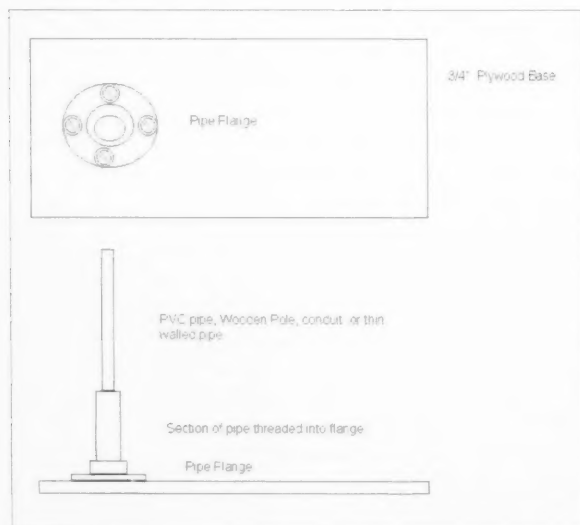


Fig. 1. A handy emergency antenna base can be constructed as shown above. A car is parked with one wheel parked on the plywood base which makes the base very stable. The antenna is attached to a lightweight pole which fits into the pipe attached to the base.

message and delivers it to the intended recipient. While this form of relay works well for many types of traffic, it would be overly cumbersome in a disaster situation.

What is needed is a combination of relay and repeater that is portable, can be located in an appropriate area quickly and easily, and will reliably support the communications need. This means that it should be easy to transport, simple to assemble, light enough so it can be carried to the highest available location, and be able to operate for a long time from a relatively small power supply. Even in this microcomputer-driven, surface mount technology miniature electronic age this may seem to be a tall order, but such a system can be built easily and implemented with a minimum of effort in the field.

The device that meets our requirements in this situation is called a simplex repeater. They are sometimes referred to as a "parrot repeater" because of the manner in which they work. A simplex repeater operates on a single frequency. It consists of a digital recording device and a timed transmitter switch. There are commercial units available, although given its simplicity you may decide to design your own version of the unit.

The simplex repeater is usually designed so that the digital recorder senses a signal on the receive circuit of a radio and switches the digital recorder on. This is essentially a voice-operated switch (VOX) which starts recording when it "hears" a voice. The unit records the message, up to the limit of its memory. After the recording stops, the simplex repeater then closes the push-to-talk circuit and plays back the message it had just recorded. The recording memory automatically resets and it is ready for the next transmission.

The radio's offset can be used so that the unit transmits on one frequency and receives on another, but most people set it up as a simplex unit. Standard repeaters simultaneously receive on one frequency and transmit on another while the simplex repeater can only perform one of these tasks at a time. I personally prefer using a simplex frequency because in a disaster

situation you may often hear the signal directly which catches your attention, then you hear the message repeated. The repeated message should be clearer if the repeater is properly located, so this works out quite well.

In my case, I wanted to have a small but durable package that would be self-contained and yet provide a satisfactory signal. For the radio I decided a 5-watt signal would be the optimal power level and I wanted to use a radio which provided standard connections for the antenna, power and simplex repeater. The obvious choice was the Alinco DJ-195, which meets these requirements and is a substantially constructed unit. The DJ-195 uses a standard microphone and earphone jack configuration that allows it to be easily connected to the simplex repeater. While the DJ-195, like almost all handie-talkies, has its own nickel cadmium battery pack, it also can accept a power supply providing 6 to 16 volts. Also, in this day of new types of

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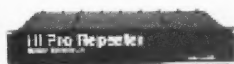


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antenna connectors, it uses a standard BNC connector.

The Radio Shack Simplex Repeater (Catalog No. 19-345) provides all of the features mentioned previously and is contained in a compact package. Although it can run from four internal AAA batteries, it will also accept an external power supply of 12 volts. Both the Alinco DJ-195 and the Radio Shack Simplex Repeater have been discontinued, so they can be purchased for a very significant discount.

The next step is to decide how to package the repeater. If I stick to my original premise, I'll want a package that is light, compact and durable. I do not need a case in the traditional electronic construction sense of the word because each component is already in its own case. I do need something that would qualify as a weather-resistant enclosure, however, since disasters are notorious for occurring in and around poor weather.

Now, I've handled my share of military equipment that is rated for every

conceivable condition. The weather deck on a ship is exposed to, well, all kinds of weather, so equipment must be protected accordingly. However, although Congress gives money to the Defense Department, they generally prefer to take it from me, so my budget for enclosures is not quite on par with the government's. Besides, I tend to be just a little cheap by nature. So I needed something light, small, weather-resistant and, of course, cheap. The natural choice? A plastic food container such as you can find at a discount or grocery store. The lid is watertight, and if I carefully make an opening through which I pass all the cables, I can seal that opening with silicone.

I decided on two cables, one for the antenna and one for power. The antenna cable has a BNC connector within the box and a PL-259 on the outside. With a barrel connector, most any two-meter antenna can be quickly connected. For the power cable, I used 14-gauge wires with large alligator clips. This allows the repeater to be

powered by any 12-volt battery, including gel cells or an automobile battery.

To provide stability for the radio and repeater, 2-inch squares of Velcro were attached to the back of the case and the inside of the food container. It's best to put the softer portion of the Velcro on the electronic devices and the stiffer hook portion in the food container. This way you can still use the HT without catching the Velcro on everything. The finished unit is shown in **Photo A**.

I toyed with various ideas as to mounting the entire unit. I've seen some temporary antennas mounted on pipes to a piece of plywood in an "L" shape. In this way the mount could be set on the ground and a vehicle parked with one wheel on the board to provide a fairly sturdy mount (**Fig. 1**).

This works out well as part of the equipment in an emergency response vehicle, but is not convenient for carrying.

Continued on page 58

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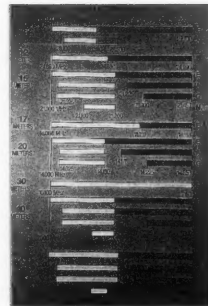
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Understanding the CWTHA

*This technical reprint about resonant contrawound toroidal helices
is good food for thought.*

Here, the resonant CWTHA is examined via a moment-method simulation. The results show a very high impedance at first resonance, with a narrow bandwidth and low efficiency. At second resonance, the resistance is less than an ohm, the reactance is zero, and again, the bandwidth is narrow. The azimuth patterns are not omnidirectional, but may have a dip of 10 dB or more. The simulation shows a loop-mode cancellation of at least 140 dB.

The contrawound toroidal helix antenna has aroused considerable interest in recent years. The concept is simple: The two windings fed out of phase cancel the loop mode and augment the dipole mode, thereby providing a low-profile antenna that radiates an electric field normal to the plane of the toroid. As originally conceived by the inventor, Dr. Corum, the CWTHA was a resonant antenna — that is, it operated at a frequency where the antenna was resonant.¹

A recent study² showed that, when the winding length is less than quarter wavelength, the current is approximately constant, and the pattern in the plane of the toroid is omnidirectional. However, it was shown that the radiation resistances for these small antennas were extremely low. The objective of this work is to examine the larger self-resonant CWTHA.

Moment-method simulation

Although the exact vector potential solution has been written for the CWTHA, numerical integration is required to obtain numerical values. Here, the antenna is simulated via the moment method. The code used is the Tilston-Balmain bridge current modification of the Richmond piecewise sinusoidal Galerkin code.³ Studies on single-turn loop antennas have shown that 12 segments per turn gives an excellent representation of a circular turn. Thus, the results discussed here are based on 12 segments per turn. The coordinates of the two windings can be written exactly in spherical coordinates.⁴ The two windings have one common feedpoint. The number of segments for each winding is then 12 times the number of turns of wire around the helix. To obtain a preliminary idea of the performance of the resonant CWTHA, the two cases examined both have a ratio of toroid diameter to turn diameter of 10, and a ratio of turn diameter to wire radius of 20. This allows a reasonably fat wire, but assures convergence. A wire conductivity of 90% of that of pure copper was used. Because the matrix is poorly

conditioned due to the counteracting windings, all calculations have been done in double-precision complex.

Results

Case 1 involved 20 turns. To avoid a multiple-parameter presentation, 100 MHz was selected as a realistic value, representing, in general, both HF and UHF effects. Of course, these antennas

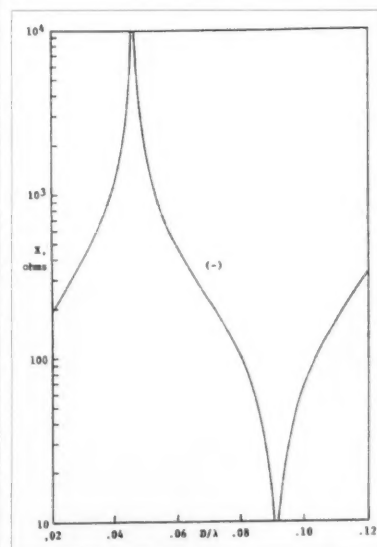


Fig. 1. Reactance for 20-turn CWTHA.

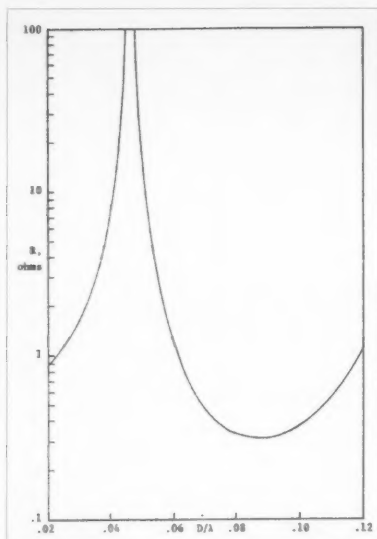


Fig. 2. Resistance for 20-turn CWTHA.

are of no use in the microwave region, where electrically small antennas are not needed. This case used 481 equations. One unknown couples the two windings. The loop-mode cancellation was 143 dB. Fig. 1 shows the reactance of this antenna for a diameter range from 0.02 to 0.12 wavelengths. It can be seen that the first resonance is extremely sharp and the Q is high. It occurs for a toroid diameter of 0.046 wavelengths. At the second resonance, toroid diameter of 0.091591,

the reactance is zero. Fig. 2 shows the corresponding input resistance, and again, the Q has increased the intrinsic radiation plus loss resistance at first resonance. At the second resonance, the resistance is varying slowly, and is roughly 0.3Ω . A calculation of Q , assuming constant resistance, gives a value of 1,635 there. It is interesting to note that the currents opposite the feedpoints are almost the same as those at the feed, with maxima at $\pm 90^\circ$ points. This is probably because the structures, although resonant due to the winding, are still small in wavelengths. Fig. 3 shows a quarter of the azimuth pattern normalized to 0 dB at $f = 0$; the other quadrants are images. Note that there is almost a 10 dB dip at $\pm 90^\circ$, so the antenna is not at all omnidirectional. The elevation pattern is closely that of $\sin \theta$. Note that, in the patterns, the z -component of the electric field is used, rather than the spherical coordinate component. The efficiency was less than 0.2% due to the small intrinsic radiation resistance. At second resonance, the efficiency was 7.4%, but matching losses, to match 0.3 to 50Ω , would decrease this significantly.⁵ For a toroid diameter of 0.43821, the input resistance was 50Ω . However, the inductive reactance was $3,000\Omega$, which would provide a very

small bandwidth if matched with a capacitor.

Case 2 was similar, except that it employed ten turns. All other parameters were the same. For this antenna, 341 equations were used. The principal change is that first resonance now occurs for a toroid diameter of 0.09121, and second resonance occurs for a toroid diameter of 0.18081 due to the smaller number of turns. Again, both the real and imaginary parts of impedance are very sharply peaked at first resonance, indicating a high Q . The efficiency is roughly 1%. The reactance is also rapidly varying at second resonance; Q was calculated to be 2,300. The efficiency there was higher, 30%, but the small resistance of 0.3Ω makes matching very lossy. The azimuth pattern is flatter, showing a dip of somewhat more than 4 dB. Again, the elevation pattern is essentially $\sin \theta$. The loop-mode cancellation is 181 dB. The 50Ω input resistance occurred for a toroid diameter of 0.087573 wavelengths; again, the inductive reactance was $4,000\Omega$, very large. It is to be expected that the impedance will again be very high at the third resonance. However, at the higher resonances, the toroid diameter is no longer electrically very small.

The winding length is given approximately by

$$l = \pi D \sqrt{1 + [NT - NS \sin(\pi / NS) / \pi(D/d)]^2}$$

where the toroid and turn diameters are D and d , NT is the number of turns, and NS is the number of segments per turn. For case 1 with $NT = 20$, the wire lengths at the two resonances are 0.321 and 0.641; for case 2 with $NT = 10$, they are 0.641 and 1.261.

Conclusions

The resonant CWTHA exhibits a very high Q at the first two resonances, and as expected, a very narrow bandwidth at both. Azimuthal dips occur with depths depending on the ratio of toroid to turn diameter and the number of turns. For the two cases calculated, the dips at first resonance range from

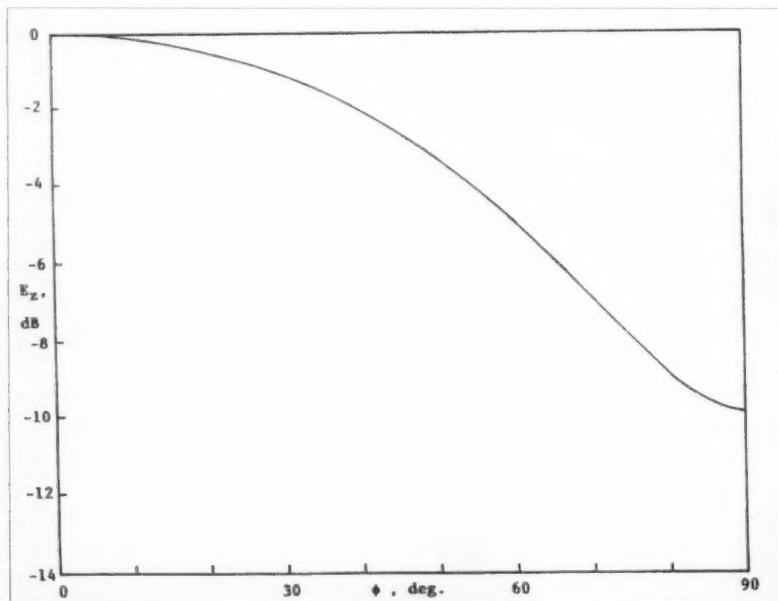


Fig. 3. Azimuth pattern for 20-turn CWTHA.

MFJ's 1899T Portable Antenna

Great for the Yaesu FT-817 or any other QRP rig ...

Over a year ago, I purchased a new Yaesu FT-817 Backpacker transceiver. This small "do all" and "go everywhere" portable is a real delight to operate. I was enjoying experimenting with all the modes of operation right from my home QTH, using the station's big antennas.

While trying to think up something else to do with this marvel of HF/VHF/UHF packaging, I realized that I had not attempted portable/battery operation. But why not?

The transceiver is designed for portable use — just add batteries and go! No, hold on a minute, I realized that it needs an antenna of some kind, something portable, small, lightweight, and something that'll work. The proverbial "wet noodle" is small and lightweight but even when used with the best antenna tuners, it just doesn't work.

I began to read magazine articles, check into QRP chat groups, and make a lot of general antenna inquiries. I found that just about everything has been used as a portable HF antenna with varying degrees of success. I learned quickly that with QRP, one man's failure can be another man's success.

Because of small capture area, short ended whips normally just can't perform to the level necessary to maintain the QRP fun!! For me, this was verified when I purchased several mono-band HF whip antennas. I could hear the strong stations all right, but I almost went hoarse trying to get just one of them to answer me.

Before giving up on the idea of HF portable in the hopes that any QSO I'd get would be more than just pure luck, I wanted to try one more antenna, the MFJ-1899T all-band vertical. I had heard that Martin Jue (president/founder of MFJ) had become an ardent fan of QRP and was offering several new QRP accessories, including an 80- to 2-meter portable antenna for the Yaesu (or any QRP portable) FT-817.

Arrival

I was at work when UPS delivered an 18"-long box. You're kidding, right? An 80- through 2-meter antenna inside this box? No way. This is not what I had expected. Opening the box revealed a two-piece antenna, one a telescoping section and the other a rod covered in black heat shrink with a series of brass holes, a small jumper wire referred to as the wonder lead, and a page and a half of printed information.

Assembly requires no instruction. Intuitively, you screw the telescoping section into the black base assembly — assembly done! The initial appearance of the MFJ-1899T resembles a dwarfed version of the popular outbacker mobile antenna. The half

page of instruction illustrates which tap to use for which band of operation. Additionally, you are advised to adjust the telescoping section to obtain the best SWR match. More on the antenna documentation later.

The MFJ-1899T is composed of two sections and when connected measures 19 inches. By the way, 19 inches is roughly a quarter wavelength for 2 meters. Fully extended, it measures 64 inches. The larger base section has a 1/2-inch section of threaded brass that screws into the telescoping section. A good tight fit was evident between both major sections as well as between each section of the telescoping whip. It is very important that good, tight, metal-to-metal contact be made if this kind of antenna is going to perform for any length of time. The small sheet of instruction identified six individual taps corresponding to the various ham bands. Carefully feeling around, I discovered that there was a seventh tap adjacent to the sixth one, and it was still under the protective heat shrink.

A small pocketknife opened the heat shrink sufficiently for me to insert the wonder lead plug. If I were a betting man, I'd guess that this tab works best at 4 meters (a band not available to



Photo A. Test setup with steel bowl.

U.S. hams). Somewhere within the combination of the telescoping section and the base loading coil tap you'll find a resonance for 80- through 2-meter operation.

The feedpoint of this antenna uses a BNC-type connector. At first, I was concerned about the free play within the BNC connector, but I soon discovered that it was spring-loaded. I am not

the antenna, away from body capacitance and any possible damage to the radio.

Playing with it

So how does it work? Does it work at all? After attaching the antenna to my FT-817 and selecting the various taps, I "surfed" the ham bands from 80 meters all the way up to 2 meters by

real sure what advantage free play at this point might have. I did notice one thing that made me extremely uncomfortable, and this was the loading that this antenna has on the FT-817 front panel mating connector. When the antenna is fully extended, the FT-817 becomes very unstable and prone to falling over! After initial trials with the front connector, I was fearful that damage would be done to the FT-817 connector. Instead, I use a mobile mag mount attached to an inverted metal

only having to change the antenna tap. Reception of HF stations, including shortwave broadcast, was very good. However, all QRP operators are aware that receiving is one thing, but can it get out? Believe me, this little antenna can!

Transmitting performance of the MFJ-1899T was excellent. I was able to get within 2.5 to 1 SWR on all bands without a tuner. Using a tuner allowed me to get a flat reflected wave regardless of the band. As a way of gauging its performance, I ran a series of very unscientific tests comparing it to a couple of monoband whip antennas and a random 175-foot endfed wire. Using a small QRP antenna tuner and some random fashioned counterpoise, I was able to get a near-perfect SWR null on all bands. Using the counterpoise seemed to improve the signal-to-noise ratio on receive, and aided in helping DX stations copy me a little better.

I am sure a better setup would be to make or purchase a tuned set of counterpoise wires. Make no mistake, the remaining half of the quarter wave waveform is necessary, no matter how you get it. The counterpoise is very important to the operation of this type of antenna. Many hams write off vertical whip-type antennas because of poor performance, when more often than not all they need to do was add a counterpoise.

Unscientific testing

The MFJ scored excellent in the QSY department — changing bands

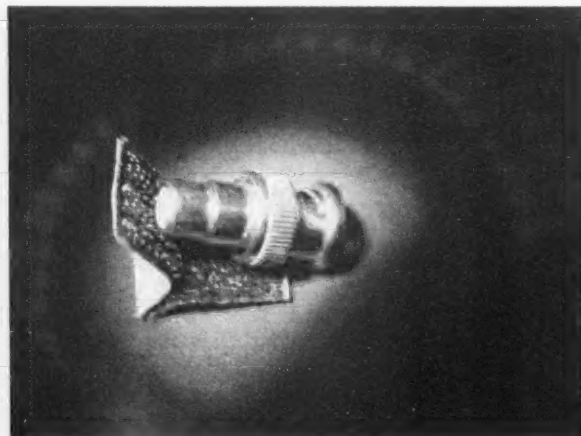


Photo B. Connector.



Photo C. The seventh tap.

was fast and easy. Once on the air, general reception was about the same regardless of which antenna I used. I said "about" — remember, this is not scientific.

Sometimes the wire would bring a station as much as an S-unit or two higher than either of the whips. This might have been because of cross-polarization difference or any gain as a result of the other station being in the wire's major lobe.

The differences between all the test antennas became more apparent when I found out that stations could hear me with the MFJ antenna but not the other whips. When I switched between the monoband whips, I received very poor reports — often "cannot copy" reports. Depending on the contacted stations' geographical location as compared to major lobe of the random wire antenna, they may or may not hear me. If the station I was in QSO with was in the broad side of the wire, the MFJ-1899T could not perform as well.

Although this was a very uncontrolled series of tests, I find that this is exactly what most hams do. For me, it illustrated that I could use this antenna for portable use and make contacts.

By the way, did I mention that from Connecticut/Massachusetts border, I was able to work throughout Europe, many midwestern U.S. states, several Caribbean islands, and my biggest DX, Israel, all with the FT-817 and the MFJ 1899T!! And this was with less than 5 watts on 20- and 17-meter SSB, not from a mountaintop, nor on some perfect ground plane body of water, but from my backyard, 100 feet above sea level.

As far as the lower HF band performance goes, a couple of times I managed to check into the horse traders net on 3898, where the net control station is located about 800 miles south of me. That's 80 meters in case you missed it. This is not a 132-foot 80-meter dipole, nor does it pretend to be. But it does allow you to make some contacts on 80 meters under restricted conditions.

One of my favorite methods of testing an antenna is to pick an HF band that offers ground wave propagation. Ten meters late at night usually is

dead, allowing just the locals to communicate with each other. The nice thing about ground wave is that it eliminates any effect skip can have on the raw capability of an antenna to launch a signal. The MFJ-1899T again outperformed the monobander whips, the difference in performance being that stations were able to copy me with the MFJ antenna when they couldn't otherwise. Most of the time, I received reports that I was not giving any S-meter reading but was FB copy! Most 10-meter ground wave stations were 10 to 15 miles from my QTH.

Some things could be improved

In spite of all the excitement generated by the MFJ all-band portable antenna, there are some issues that need to be addressed by MFJ.

The documentation can only be judged as poor. This is not the standard documentation that MFJ has provided with all their other products. The one and a half sheets of poorly reproduced instructions and information mostly discusses the need to use a counterpoise with the antenna for maximum efficiency. The half-sheet piece of documentation (barely readable copy of a copy) provides estimated lengths for the telescoping whip as required for each band of operation.

No mention of the famous MFJ guarantee — in fact, the MFJ logo is obviously missing. Because of the British spelling of certain words in the text, you soon realize that MFJ is privately labeling the MFJ-1899T. In the U.K., this antenna is sold as the ATX by Waters and Stanton Company and in Germany by WiMo Antennen und Elektronik GmbH. A quick call to Waters and Stanton confirmed that MFJ was their U.S. distributor. A clear and much better copy of the documentation is available at Waters and Stanton Web site, [http://www.wsplc.com/leaflets.html].

A quick check of the ATX antenna as sold by Waters and Stanton reveals that their version of the MFJ-1899T ATX is available configured with PL-259 or a 3/8-inch threaded fitting as

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Continued on page 59

Snakebit!

A radio tale about the importance of getting things right the first time.

The rhythmic staccato of the code sender seemed like a stream of bean shooter beans bouncing against Charlie's brain. Why, oh why, had he gotten roped into the business of learning ham radio?

He was sure he would never fully know. Lots of study, lots of frustration with the code, working the late hours as a bag-boy to pay for the little handie-talkie, and now sweating out General Class. Maybe he should have stayed at Tech. And he would have, were it not for his "Elmer."

Charlie's "Elmer," Don Wilke, was an old-school ham. Code was his thing, and he constantly lamented its demise, worrying that one of the final communicative arts would breathe its last in the very near future. Charlie would have just been content to sit with his Tech ticket. But not Don. And little did either know that this bit of gentle persuasion coupled with hours of practice, would reach their culmination in one brief test of radio skill.

The "dahs" and "dits" kept coming. Charlie sat there, sometimes as much as two to three letters behind, jotting down the words of the canned QSO. Here a number, there another number. Temperature. Street address. Wants a card. 73, and it was over.

"Well, how did you do?" inquired Don. Charlie wasn't all that confident, but he knew he had to face his "Elmer"

sooner or later. He had not been all that crazy about Don driving him over to the exam, but since he couldn't drive and his folks were busy and it was too far to bike, there was little choice. So now, the inevitable question faced him: "How did you do?"

"Don't know," grunted Charlie. "I suppose I got enough to pass. If not, there is always next time."

"This time there's a next time," returned Don. "How about if you are in a position where you only get one chance? Maybe that particular transmission won't come the second time. You'd better get it right the first time or face the consequences!"

Charlie didn't like it when Don lectured. He knew Don was right. He knew his father and mother were right. The advice was good and sound, but not welcome.

"Yeah, you're right," mumbled Charlie. "I probably missed a few, but I still think I passed. I did everything you said. Guess I'll have to work on technique some more."

Their conversation was cut short by the volunteer examiner's appearance in the waiting room.

"Charlie Phillips?" he called. "We need Charlie Phillips up here now!"

"Oh, great," thought Charlie. "Not only didn't I pass, but now this idiot is going to publicly humiliate me in front of the whole room. There must be at least 45 people here. And several friends from school. And I'll be the only one who didn't pass. What a rip."

Charlie's thoughts were cut off by the VE's broad smile and handshake.

"Congratulations, Sport," beamed the VE. "Your copy was five-by. Come on over here and let's see how you can send."

The rest of the escadrille was a piece of cake. Charlie had a good, natural fist, much to Don's delight. It wasn't long before a brand-spanking-new General Class ham radio operator left the examination hall.

"Well, let me be the first to congratulate you, Charlie," offered Don. "You've just opened up a lot of frequencies and opportunities. I bet your Dad will kick in the difference of what you need for the HT. He really wanted to be here, but duty called. Bet all you have to do is ask," Don continued with a sly grin.

"So you two have been plotting this thing all along and together, haven't you?" demanded Charlie. He should have known that his Dad was in on

this. Dad had a good job but worked pretty hard at it. Charlie's initial interest in becoming a ham had come from his father. And now that interest was, about to pay dividends.

"You might say that," replied Don. "We kind of worked it out together. I believe that if the lawn is cut and trimmed by the time he gets home tonight, it's in the bag!"

The drive home was marvelous. Don let Charlie work every repeater in town. He even let him work K8JHB, the exclusive closed private repeater that had all the bells and whistles on it, even being able to tell if someone had left you a message. It was said that only old or rich people could become members of K8JHB. Don was a member. Charlie called his mother through the patch to tell her the good news. It was a great day.

It had been a great day and was about to get better. Charlie cut grass and trimmed the entire lawn during the course of the rest of the afternoon. He had just finished and was noting the time. Five p.m. They were really working his Dad a bit hard today. Usually he got off by 2 p.m. on Saturdays. It was now past five. He was just starting to think about being concerned when a familiar rumble reached his ears. Sure enough, Dad was pulling in with old Growler, their jeep. Growler was a project unto itself, and something Charlie couldn't wait to drive in a year or two. His time would come. He knew Dad would never get rid of Growler. It was too much fun to have around. His father ripped off the seat belt and jumped out of the jeep.

"How did you do on the test?" he demanded.

"I aced that sucker!" exclaimed Charlie. "Piece of cake."

"Roger on the cake!" his father shot back. "I got some stuff for you to carry in. Come on out and help."

Charlie hadn't noticed any boxes in the jeep. It was only when he came close that he saw the all-too-familiar plastic bags from "Signal Sam's Ham Radio Store."

"What's in the bag?" he questioned. But the grin on his father's face gave it all away. "Oh, yowee! You didn't, did you?"

"Sure, why not? I had promised you, hadn't I?" asked his Dad. "Don called me on the land line as soon as he got home. That's why I was a bit late. Wanted to have it all ready for you when I got home. Consider it your birthday, Christmas, graduation, and wedding present for the next five years!"

With a hurried "thanks," Charlie drew the little HT out of its box, turned it on, and keyed up, without bothering to listen. The little instrument responded by emitting the CW call of the local repeater. His call sign in label tape was already on top of the rig. Things were just going too well. His euphoria was brought sharply back to earth by a stern rebuke from his father.

"You ever key up like that again without listening first and then not IDing and you won't have this thing very long!" his dad instructed. "You know much better than that. The operating procedures are clear. Now ID and apologize."

Charlie didn't like it when he screwed up. He didn't like it especially when he did so in front of his father. His dad was fair but very firm. He knew he would have to apologize to the whole world over the repeater, and he knew Don was listening. But there was no way out. So he did.

That evening was great. There were instructions to read, batteries to recharge, buddies to talk to. The worst part was sharing with his dad, brother, and sister. All were hams. The only one in the family who wasn't radio-active was Mom — and they forgave her for that because she was a very

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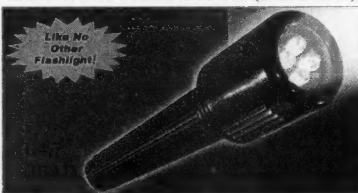
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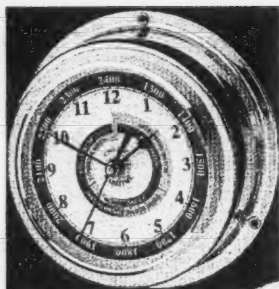
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understanding person and a marvelous cook. Charlie made contact after contact. It was after 11 p.m. when they finally quit, and that was only because everyone else in town had gone to bed and the repeater fell silent of its own accord.

inches. There was some local flooding but nothing bad. Sleeping was good and even in his excited state, Charlie finally fell asleep to the gentle drumming of the rain on the deck roof.

Sunday dawned clear and bright.

And anyway, about that time, it started to rain. One thunderstorm after another rolled through the area. Charlie checked it out on "The Weather Channel." They labeled it a Mesoscale Convective Complex or, simply, an MCC. Charlie had never heard of it.

The offending weather system put down a lot of rain during the night, on the order of three to four

they were soon off to church. Dad made Charlie leave the HT at home. The last thing church needed was to have someone's HT go off in the middle of the sermon. There were plenty of mobile phones and beepers to do that anyway.

Charlie thought church would never end. But the last "Amen!" was finally said and the family went home. The usual quick Sunday lunch followed and, after filling his water bottle, Charlie set off to rendezvous with his friends at the bike trail.

"Hi, Charlie," called Bill and John. "Heard you finally got your handie-talkie. Can we see?"

Neither Bill nor John were yet radioactive, but this last little bit of persuasion was sure to win them over. Charlie let them both do a short transmission, which really impressed Bill. John was still not all that sure.

"Wouldn't a cell phone do the same thing?" he asked. "Plus, I don't need a license for it."

"You still have to pay," returned Charlie. "And you have to pay a lot if you go over the initial time limits that the phone company sets. This is kind of a one-shot deal."

"Yeah," agreed John, "but what happens when you can't hit the repeater?"

"Same thing that happens when you can't hit the cell!" returned Charlie. "You don't talk!"

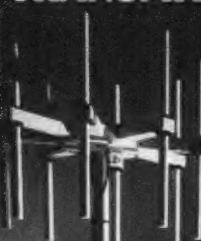
"Aw, come on, you guys," pleaded Bill. "Let's get going and see how far that thing will reach."

None of them needed any more prodding. They set off down the bike trail, taking their time and checking into the repeater about every fifteen minutes. About an hour and a half out of town, they began having trouble hitting the repeater.

"Huh. About ten to twelve miles out. Not bad. Too bad I can't get into K8JHB. I bet it reaches all the way out here," thought Charlie.

They stopped to rest a bit. For the first time, Charlie noticed exactly how rural the area really was. There was only one small house in sight. No roads of any consequence, and because of the newness of the trail, no one on the trail either. And it was quiet.

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Charlie hadn't noticed just how quiet things could get.

However, the peace was short-lived, being broken by a scream coming from the lone farmhouse a little over a quarter of a mile from the track. It froze all three of them for just a second. But upon hearing a second cry for help, they left the trail and headed for the house.

The scene that greeted them was scary. The young family, a husband, his wife, and two children, were huddled over a third child who lay very still in the yard.

"Damned old snake," raged the husband, as he kicked the now-dead copperhead again. "Don't know what he was doing crawling around here in the lawn. He won't bite anyone else, that's for sure."

"Oh, it doesn't make any difference," wailed the young mother. "Julie is going to die, I just know it."

"Why don't you telephone life-flight," ventured Charlie. "They can be out here in a matter of minutes. Since they know what kind of snake they are dealing with, they can come totally prepared, in maybe eight to ten minutes or so."

Charlie's speech was cut short by an oath and angry gesture from the father.

"Stupid telephone is out," he screamed. "Happens every time it rains. And in this day and age!"

"Well, how about using the cell phone," inquired Charlie. "You do have a cell phone, don't you?"

"Of course I do," snapped the young father. "But I have to just about be in town to make it work! I don't know why they can't put a cell pole out here further." The father's speech trailed off in sheer despair.

"Charlie," began John slowly. "Try the HT and see if it will reach."

For an instant, Charlie felt like an idiot. And even when he comprehended what John was suggesting, it took him a precious few seconds to swing into action. One by one he tried the repeaters. One by one, each returned him silence. He was too far out for the HT to reach. No one had a high enough antenna to go through. He had the same dilemma that the cell phones had.

"Charlie," ventured Bill. "You said there was one super-duper private repeater. Have you tried it? Surely they wouldn't mind if you used it in an emergency. Why don't you give it a try?"

Almost before Bill finished speaking, Charlie had the K8JHB frequency locked into the HT. He nervously listened for a few seconds before keying the transmitter. Would someone answer him? This was a pretty exclusive bunch. There was hardly ever any activity on it. Seemed as if the old and rich never really used it but just had it around like some ornament.

"This is WD8LLU. Can anyone read me?" Only silence followed.

Charlie re-keyed the HT.

"Come on, someone, please. This is WD8LLU with a medical emergency about 25 miles southwest of town on the new bike track. A small child was bitten by a copperhead. WE NEED HELP!"

What happened after that still amazes Charlie. It seemed like the whole town was listening on the frequency. A calm, mellow, yet authoritative voice answered his call.

"WD8LLU, this is K8CQL. Give approximate location and particulars. Please speak slowly and distinctly, your batteries are fading and you are starting to cut out."

Charlie did as he was instructed. Even as he spoke, the super repeater was transmitting his message via landline to the Mid-Continent Medical Center. Before he finished, a life-flight crew had the engines turning on their 'copter and were just about on the way. They had been briefed about the track and the possibilities of picking up patients along it. The crew had flown the route just days before.

"Yep, know the very place," muttered the pilot as he called for the take-off procedures and advanced collective. "Won't take long."

And it didn't, either. Within less than ten minutes of placing the call, the paramedics had little Julie and her entire family in the belly of the beast and were heading back to town.

"Woof," muttered Charlie. "Not even a thank-you."

"Jeepers!" exclaimed John. "What did you expect? How rational do you think you would be if your little girl got bit by a copperhead?"

"Probably not too rational at all," admitted Charlie. "Probably not too rational at all. I suppose that all there is left to do is to head on home. It's going to be a long fifteen miles."

The trip went surprisingly fast. After the initial letdown of the rescue, the second adrenaline rush soon hit and the excitement of being a part of a rescue sunk in. As soon as they entered town, it was obvious that things had turned out well. A TV station had picked up the story and was making the most of it. Before they knew it, a mobile crew had them all pinned down and were doing an interview. Charlie thought it would never end, but it finally did. And everyone went home, much to Charlie's delight.

A week later, the grass needed cutting again. Charlie had just finished the job when a tired, beat-up 4x4 pickup truck with K8JHB license plates pulled up in the driveway. A young, energetic man in his early 20s in blue jeans and tee-shirt swung out of the truck.

"Are you Charlie Phillips?" inquired a very mild, mellow, yet authoritative voice.

Speechless, Charlie nodded.

"Right," replied the man. "I am K8JHB. I would be honored to have you as a member of my repeater community. Here are the accessing codes. Use it all you like."

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MAR 2

CAVE CITY, KY The 26th annual Mammoth Cave ARC Hamfest will be held Sat., March 2nd, 7:30 a.m.-2 p.m. CST, at Cave City Convention Center (I-65, Exit 53). Admission \$6, tables \$7. Tailgating, ARRL forums, Bingo, 3.960 MHz meeting. VE exams at 9 a.m. Contact *Jim Erskine KD4GNN*, [mailto:chirotoons.com], or P.O. Box 187, Canmer KY 42722.

KNOXVILLE, TN On Saturday, March 2nd, the Shriners of Kerbel Amateur Radio Service will sponsor their annual hamfest at Kerbel Temple, 315 Mimosa Ave., Knoxville TN 37901, 8 a.m.-4 p.m. Admission is \$5. Indoor vendor tables are \$8 plus admission. Contact *Paul Baird K3PB*, 1500 Coulter Shoals Circle, Lenoir City TN 37772. Tel. 865-986-9562. Setup Friday 4 p.m.-8 p.m. and Saturday 5 a.m.-8 a.m. Overnight security will be provided. Talk-in on 144.83/145.43 or 146.52 simplex. Smoking indoors is permitted in designated area only.

MAR 2, 3

ANNANDALE, VA WinterfestSM, Metro DC's first and best hamfest, will be held by the Vienna Wireless Society, Sunday, March 3rd, 8 a.m.-2 p.m. at Northern Virginia Community College campus, Annandale VA. VE exams Saturday, March 2nd at 9 a.m. All activities indoors. Directions: In northern Virginia, I-495 (Capital Beltway) to Exit 52A (Rte. 236/Little River Tpk. westbound). NVCC is 1 mile on the left. Admission \$6. Vendor tables \$20. For vendor info, contact *Terry Hines N4ZH*, 703-560-1824. Additional info can be found online at [http://winterfest.home.att.net/]. E-mail [winterfest@att.net].

MAR 9

SCOTTSDALE, AZ The Scottsdale ARC, Inc., will host a hamfest March 9th, starting at 6 a.m., at Scottsdale Community College, 101 North - Exit Chaparral Rd., in Scottsdale. Parking \$2. Tables \$10. RV parking, self contained. VE exams. Refreshments. Talk-in on 147.18. Contact *Ed Nickerson WU7S*, 902 N. 73rd Place, Scottsdale AZ 85257. Phone 480-949-5162, E-mail [Brickers@qwest.net].

MAR 9, 16, 23, 28, AND SEP 24

ST. LOUIS COUNTY, MO Three all-day
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training Severe Weather Observation seminars are planned at various locations around St. Louis County MO. At most locations SKYWARN Level 1 training will be presented in the morning, and classes resume in the afternoon with the SKYWARN Level 2 Program. Training will be held as follows: Saturday All-Day Classes: March 9th, March 16th and March 23rd. Evening classes (Level 1 only): March 28th and September 24th. For locations call the Severe Weather Information Line, 314-615-7857, for a taped message and additional information. There is no charge for the training. All are welcome including those from outside the area. Free parking. Certification provided for R.A.C.E.S. and SKYWARN, all at no cost. Attendance by members of the amateur radio community is encouraged, however, one need not be a ham operator to attend and participate in the program. Come and be a part of the largest SKYWARN program in the area, and monitor our SKYWARN nets during severe weather on 146.940 or 147.360 MHz.

MAR 10

AMHERST, MA The Mount Tom ARA will sponsor the 17th Annual MTARA Flea Market at the Amherst/Pelham Regional Middle School, 170 Chestnut St., Amherst MA, on Sunday, March 10th. Doors will open at 7 a.m. for vendors and at 9 a.m. for bargain hunters. Admission is \$5 per person, children under 12 admitted free. Tables \$15 (reservation required), tailgating \$5. Amateur radio equipment, computers and parts, snack bar, no stairs, handicapped parking and help loading and unloading. 120 VAC available. Amateur and commercial VE exams given at 10 a.m. Contact *Dave WA1DC* for details about the exams by E-mailing to [wa1dc@pipeline.com], or *Steve N1SR* at 413-593-6554 for GROL, GMDS-O/M, ship radar, etc. exams. Talk-in on the 146.940(-) and the 145.130(+) PL 71.9 rptrs. For table reservations contact *Bob K1YO* at 413-569-0320 or [k1yo@arrl.net]; or *Cindy K1ISS* at 413-568-1175 or [n1fi@arrl.net]. Visit the Web site at [www.mtara.org] for more info and for driving directions.

MAR 16, 17

MARIETTA, GA The 49th Annual Kennehooche ARC Hamfest and 1st Emergency Communications Expo will be held at Jim Miller Park (formerly Cobb County Center Park), in

Marietta. A map is available on the Club Web site at [http://qsl.asti.com/hootch/KARC-HamF.html]. This event is open Saturday 8 a.m.-5 p.m. and Sunday, 8 a.m.-3 p.m. Vendor setup Friday, March 15th, beginning at 1 p.m. Admission (good for both days) \$5 at the gate. Children under 12, supervised by an adult at all times, are admitted free. Along with all the usual hamfest trappings, a one-day (Saturday) Technician Class "Boot Camp" will be held on site. The onsite exam for "boot campers" will be held at 5 p.m. Saturday. All other VE Exams will be at 9 a.m. Saturday only. Bring a copy of your license, there is no copier on the premises. The Emergency Communications Expo will feature exhibits and static displays from local and state emergency teams, vendor booths, and informational seminars. Outside (under cover) bone yard and tailgating spaces are available. Talk-in on 146.880(-) PL 100 (KARC rptr.) from Friday, March 15th at 1 p.m., all day Saturday, March 16th; and until 2:30 p.m. on Sunday, March 17th. For more info contact *Mike Fisher KG4DPF*, 770-971-3610; or *Bob Butler W4RBB*, 770-579-9420, before 9 p.m. EST. You can send E-mail to [w4rbb@arrl.net]. Send written inquiries to KARC, P.O. Box 1245, Marietta GA 30060.

MIDLAND, TX The Midland ARC will hold their annual St. Patrick's Day Hamfest on Saturday, March 16th, from 8 a.m. to 5 p.m., and on Sunday March 17th from 8 a.m. to 2 p.m., at the Midland County Exhibit Building. Huge inside flea market with many dealers, large tailgate area, T-hunts, and a full service concession stand with hot meals, are some of the features. VE exams will be given at 1 p.m. on Saturday. Pre-registration is \$8, \$9 at the door. Tables for non-dealers are \$12 each for the first four, and \$20 for each additional table over four. For more info, contact the *Midland ARC*, P.O. Box 4401, Midland TX 79704; or contact *Larry Nix N5TQU* by E-mail at [oilman29@home.com]. You can view the hamfest flyer online and download a registration form at [http://www.w5qgg.org].

MAR 17

JEFFERSON, WI The Tri-County ARC will sponsor a Hamfest Sunday, March 17th, 8 a.m.-2 p.m., at the Jefferson County Fairgrounds Activity Center, Highway 18 West, Jefferson WI. Vendors will be admitted at 7 a.m., all others at 8 a.m. only. Vendors only parking will be provided for unloading. Talk-in

on the 145.49 rptr. Admission \$4. Table space for 8 ft. tables @ \$6 each. For further info, contact **TCARC, 213 Frederick St., Fort Atkinson WI 53538**. Evening phone 920-563-6381, Fax 920-563-9551; or send E-mail to tricityarc@globaldialog.com.

MAUMEE, OH The Toledo Mobile Radio Assn. (TMRA), will hold its 47th Annual Hamfest/Computer Fair, 8 a.m.-2 p.m., at the Lucas County Rec. Center, 2901 Key St., Maumee OH. For details, send an SASE to **TMRA, P.O. Box 273, Toledo OH 43697-0273**. For voice mail call 419-535-6594. Web [\[www.tmrahamradio.org\]](http://www.tmrahamradio.org).

MAR 23

BRAMPTON, ON, CANADA The Brampton Fall Fairgrounds will be the location for "HAMEX 2002," co-sponsored by the Peel and Mississauga Amateur Radio Clubs. This event will feature amateur radio equipment manufacturers, major commercial vendors, new and used equipment and parts. VE exams, seminars, exhibits and demonstrations. Vendors are admitted at 7 a.m. The general public can enjoy this event from 9 a.m. to 1 p.m. Admission \$6; 6 ft. tables \$25; 8 ft. tables \$30., includes one free admission per table. Talk-in on VE3PRC at 146.880(-), and VE3MIS at 145.430(-). For more info contact **Jason Staines** at 416-878-0576; or **Lorne Jackson**, 905-858-8594. E-mail can be sent to [\[va3ngv@rac.ca\]](mailto:va3ngv@rac.ca) or [\[ve3cxt@rac.ca\]](mailto:ve3cxt@rac.ca). For online info, set your browser to [\[www.peelarc.org\]](http://www.peelarc.org).

MICHIGAN CITY, IN The annual Michigan City Hamfest will be held Saturday, March 23rd, at Michigan City High School, 8466 W. Pahs Rd., Michigan City IN, from 8 a.m. until 1 p.m. CST. Early setup provided for vendors. Admission is \$5, children under 12 are admitted free with a paid adult. Table reservations and general info is available from **Ron Stahoviak N9TPC**, 5802 N 400 W, Michigan City IN 46360. Tel. 219-325-9089.

MAR 24

MADISON, OH The Lake County ARA, of Painesville OH, will hold its 24th annual Hamfest/Computerfest, 8 a.m.-2 p.m., at the Madison High School, 3100 Burns Rd., Madison OH. This event will feature new and used amateur radio, computer, and various other types of electronic equipment. The LCARA Hamfest will also feature craft demonstrations, and VE exams for those interested in earning an amateur radio license. Admission \$5, tickets may be purchased at the door. 6 ft. tables are \$8 each or \$15 for two. 8 ft. tables are \$10 each. For table reservations, call **Roxanne** at 440-209-8953.

MAR 30

BRENHAM, TX The Brenham ARC will hold its 4th annual Swap Meet on March 30th, rain

or shine, in an all-weather pavilion at Washington County Fairgrounds in Brenham TX, 8 a.m.-12 p.m. Free admission. Buy, sell, trade, new and pre-owned treasures "in the bluebonnets." No entry fee. Dealers welcome. Free covered tailgating spaces. Talk-in on 147.260(+ .600). RV hookups are available through the **Washington Co. Fairgrounds Assn.**, tel. 979-836-4112. Very large non-commercial tables are \$10 each. Commercial tables are free to commercial vendors. Please make checks payable to **Brenham Hamfest, P.O. Box 44, Brenham TX 77834-0044**. Early registration must be received by March 26th. More info is available at 979-836-9417 or the following E-mail addresses: [\[jandenis@academicplanet.com\]](mailto:jandenis@academicplanet.com), [\[briang@comwerx.net\]](mailto:briang@comwerx.net). Non-hams in your family might enjoy the Round Top Antique Show which is only a few miles away.

APR 13

ST. PAUL, MN The Robbinsdale ARC, Inc. (44 years old this year), will sponsor the 21st annual Midwinter Madness hobby electronics show at Ganglehoff Center on the Concordia University Campus in St. Paul MN, Saturday April 13th, 7:30 a.m. to 1 p.m. Concordia University is located off Interstate 94 near Hamline and Marshal. Super buys on computers, hardware, components, peripherals, and amateur radio equipment. Info, registration or tickets: 763-537-1722. Free parking. Same-day VE exams. Commercial Exhibitors. Large indoor swap meet. Admission is \$7 at the door. Children 12 and under admitted free. Advance discount tickets available at Amateur & Antique Radio Consignment Center, Pavek Museum, and Radio City. For more information visit [\[http://www.visi.com/~k0ltc\]](http://www.visi.com/~k0ltc), or E-mail [\[k0ltc@visi.com\]](mailto:k0ltc@visi.com).

APR 14

STOUGHTON, WI The Madison Area Repeater Assn. will sponsor the Madison Swapfest Sunday, April 14th, at Mandt Community Center, Stoughton Junior Fair Grounds on South Fourth St. in Stoughton. Doors open at 8 a.m. Talk-in on 147.15. For further info see the Web site at [\[http://www.qsl.net/mara/\]](http://www.qsl.net/mara/), or call 608-245-8890. Tickets are \$4 in advance and \$5 at the door. Free parking. Send payments to **Madison Area Repeater Assn.**, P.O. Box 8890, Madison WI 53708-8890.

SPECIAL EVENTS, ETC.

MAR 2

ANCHORAGE, AK The 30th running of the Iditarod® Sled Dog Race, also known as "the last great race on earth™", will begin in Anchorage AK on Saturday, March 2nd. The race finishes 1,049 miles later in the Bering Sea Coast town of Nome AK. Throughout the race the Matanuska ARA KL7JFU, will be

sponsoring a Special Event Station. During the event the Iditarod's historical background, the connection hams have to the race, and current competitor standings will be discussed. Special event cards will be sent for verified contacts on the 160- to 6-meter bands. Event certificates will be available to amateurs who have made three or more different band QSOs. QSL to **Matanuska Amateur Radio Association, P.O. Box 873131, Wasilla AK 99687-3131**. SASEs are requested for both QSL and full size certificate submissions.

MAR 16

MACON, GA The Macon ARC will operate W4BKM 1500-2200 UTC on Saturday, March 16th, at the 20th annual Cherry Blossom Festival in Macon GA. Operations will be on Phone 14.240 and 21.335, and CW on 7.135 and 14.055. For a certificate, send QSL and a 9 x 12 SASE to **Macon ARC, P.O. Box 4862, Macon GA 31208**.

MAR 22-24

OKLAHOMA QSO PARTY The Oklahoma DX Assn. will sponsor the 2002 Oklahoma QSO Party (OKQP) March 22nd 2300 UTC-March 24th 2300 UTC. All entries may operate 36 of the 48 hour time frame. Stations outside Oklahoma work as many Oklahoma stations in as many Oklahoma counties as possible. Stations in Oklahoma work anyone. For complete details go to [\[www.qsl.net/OKDXA\]](http://www.qsl.net/OKDXA). Entries must be submitted no later than April 30th. Logs should be submitted by E-mail to [\[w5atv@cox.net\]](mailto:w5atv@cox.net). Electronic logs should be named with your call (e.g., W5ATV.LOG). ADIF or CABRILLO formatted files are preferred. Paper logs of 100 QSOs or less may be submitted via postal mail to: **OKDX Assoc., c/o David Ratliff W5ATV, 3215 W 40th, Tulsa OK 74107**.

APR 13, 14

GODALMING, SURREY, UNITED KINGDOM

A worldwide radio link-up will be on the air Saturday April 13th and Sunday April 14th, the 90th anniversary of the sinking of the *Titanic*. The link-up is being organized by the Titanic Wireless Commemorative Group in cooperation with Godalming Museum, to honor the memory of Jack Phillips, Chief Wireless Telegraphist aboard the *Titanic*. Jack Phillips was 25 years old when he stayed at his post on the *Titanic*, sending out SOS distress signals in Morse code to alert other ships. He saved over 700 lives before he went down with the ship 2 hours and 40 minutes after it struck the iceberg. It was the first time that the SOS message had been sent at sea. The special event commemorative station GB9OMGY will be active on CW-only on all amateur short wave bands from 80 to 10 meters (including WARC bands), from 1000 hours GMT Saturday, April 13th, to 0219 hours Monday, April 15th (the precise time when the *Titanic* sank). 75

Winter Potpourri

Winter is here for activity via AMSAT OSCAR-40. Late in 2001, ground control stations began cutting back operating time for AO-40 users as the satellite's orientation was changed to keep the solar panels illuminated.

The most important rule for our AO-40 controllers (G3RUH, W4SM, ZL1AOX, and VK5AGR) is to keep the batteries charged. While AO-40 is oriented for maximum solar-panel illumination, the satellite's antennas may be aimed at the earth only for small portions of the orbit during the winter and early spring of 2002.

This situation will improve beginning in April, but in the meantime AO-40 enthusiasts must be patient, and exercise other hamsat-chasing options.

While we wait

The first choice for those who have become accustomed to AO-40 as their primary satellite is to adjust their schedules for the diminished operating schedule. There may be times when the satellite's antennas are aimed at the earth and the batteries are sufficiently charged to allow user access. This may not happen every day, at convenient hours or even with signal levels that make for easy contacts.

Check on the current operating schedule.

It is available on the Internet via [http://www.amsat.org]. There is a link on the front page to the AMSAT-DL site and its mirror where the schedule is initially posted. News about the schedule from Stacey Mills W4SM can usually be found in the AMSAT News Service Bulletins. These are on the AMSAT Web site and also available to E-mail subscribers. You can get the latest information sent directly to your E-mail account. For details go to [http://www.amsat.org/amsat/listserv/menu.html].

Make station improvements

When your favorite satellite is in the sky and available for

use on a daily basis, it's hard to say "stop" and take things apart to make improvements. With AO-40 effectively offline for months, now is the time to tune your system for optimum performance. If your receive system is one of the typical commercial surplus down converters with a grill-style semi-dish, a little reading can offer insight to receive system improvements. Check out *Mode S — The Book* by Ed Krome K9EK. It is available from AMSAT. You can call with a credit card at 301-589-6062 or find out more at the AMSAT Web site.

During the AMSAT Space Symposium in Georgia last October, Jerry Brown K5OE presented two papers, both dealing with antennas for use with the 2.4 GHz downlink from AO-40. The bottom line was simple — more antenna gain and a low-noise preamp. If you already have a good 2.4 GHz downconverter at the antenna, then just some simple modifications to the stock commercial semi-dish and feed assembly can yield at least three to four dB of additional gain. Jerry pointed out that the stock system is linearly polarized while the satellite signal is circular.

Changing the feed to a short helix and screening the grill with hardware cloth or screen can make that small semi-dish "look" a lot larger. There is a 3 dB loss when receiving a circularly polarized signal with a linearly polarized feed like a dipole. Screening the dish will not only make it work with a helix feed, but it will also improve dish efficiency at 2.4 GHz. Check out Jerry's plans and information on the Web at: [http://members.aol.com/k5oe/]. You can also read his presentations in the *Proceedings of the AMSAT-NA 19th Space Symposium and AMSAT-NA Annual Meeting* available from AMSAT or the American Radio Relay League.

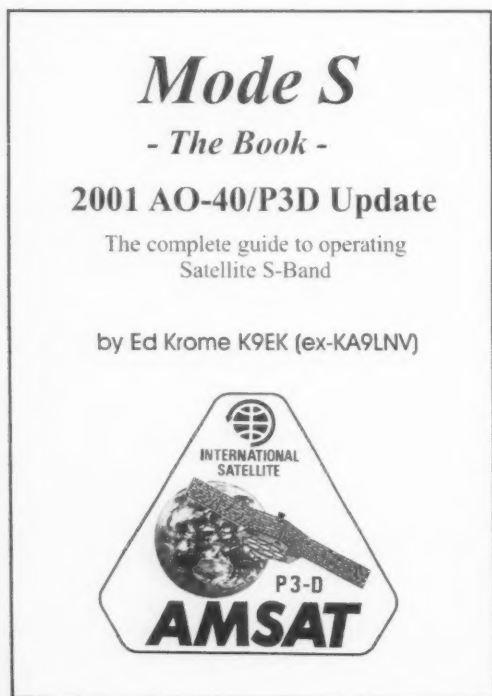


Photo A. Mode S — The Book by Ed Krome K9EK was updated and revised in 2001. It is available from AMSAT.

A good preamplifier can be home-brewed for 2.4 GHz, but if working with micro-miniature components is not for you, then consider purchasing a unit. There are a number of commercial surplus preamps available, but there are also some very good units made specifically for amateur operation. Although expensive, the DB6NT 2.4 GHz preamp is one of the best. In the U.S. it is sold exclusively by SSB Electronics [<http://www.ssbusa.com>].

An alternative to a new preamp is to get a better downconverter. Bob Seydler K5GNA sells TranSystem 3733 downconverters with excellent front-end noise figures that are ready to go for AO-40's downlink frequency band. You can contact Bob via E-mail at [k5gna@aol.com], or just look for his auctions on eBay [<http://www.ebay.com>].

When was the last time you checked the efficiency of your 70cm uplink? Now is a good time. Is the coax old? Is the antenna in good condition? How's the SWR?

Get on Mode "L"

Most of the active stations using AO-40 are on the 70cm uplink and have heard that the L-band uplink on 1269 MHz (23cm) requires a lot of power and antenna gain. To some extent this is true, but stations with modest power (10 watts) and relatively basic antennas like a linearly polarized 45-element loop yagi have been quite effective during those times when the satellite has a low squint angle relative to their location, i.e., the satellite's antennas are aimed at them. An additional advantage to using the L-band uplink instead of 70cm occurs when ground controllers turn off the 70cm receiver in order to send commands to the satellite on two meters. The L-band receiver stays on.

If you already have a system for the 23cm uplink, it too could use some tweaking for optimum performance. Just like a 70cm system, the coax, antenna and SWR should be checked. It may also be worthwhile to check out methods to uplink a circularly polarized signal with its 3 dB advantage over regular and loop yagis. If your antenna is small and the coax run is long, perhaps now is the best time to invest in an amplifier. A good place to start is [<http://www.downeastmicrowave.com>].

Consider Mode "K"

Looking for a new challenge? Building and using a receive converter for the mode "K" transponder downlink on AO-40 is not a good newcomer project unless you are already a seasoned microwave engineer. It

would take a very fat wallet to buy a DB6NT system to receive the 24 GHz signals from space. The handful of stations around the world that are currently receiving mode "K" have been microwave enthusiasts for a long time. Their systems are built from multiple components all hooked together like plumbing. Even the DB6NT system is not a simple, single box. It's built from individual filters, oscillators, and waveguide.

Most hams who are currently pursuing this "K" quest are attempting to piece their systems together from commercial surplus and home-brew components. On the Web there are two excellent places to start your search: [<http://www.sunsun.net/ao40/>] and [<http://www.oh2aue.pp.fi/ja1ati.htm>].

Get ready for Field Day

By the time AO-40 is back on-line after its long period of offpointing, Field Day will only be two months away. It is hoped that AO-40 will be available for Field Day this year, and if so, there will be a lot of groups scrambling to put together a reasonably portable station capable of S-band (13cm) reception and U-band (70cm) transmission. There is no guarantee that AMSAT OSCAR-10 will be working. Remember that it will be 19 years old when Field Day 2002 comes around!

Do some Field Day orbital predictions for AO-40 and begin piecing together your portable gear now. It never hurts to have some spares on hand should something go wrong with your home system when AO-40 is back. A complete tested S-band receive converter with dish in the garage might come in handy in addition to providing a ready-to-go AO-40 Field Day station.

Don't forget the other hamsats

That's right! Don't mope around during AO-40's vacation and forget


that there are a lot of other analog and digital hamsats out there. The FM satellites AMRAD OSCAR-27 and UoSAT OSCAR-14 continue to be popular with the HT crowd. PCSat has had its periods of low solar illumination, but has also had many periods of full battery charge for APRS and packet experiments by both mobile and portable users. The Fuji and RS satellites continue to provide excellent SSB and CW communications while UoSAT OSCAR-22 has been the mainstay of 9600-baud digital enthusiasts. A new Russian/Australian hamsat named Kolibri may have already been hand launched from the International Space Station by now. Even with AO-40 out of sight for a while, there's still a lot going on. Check it out! 73

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Photo B. The Proceedings of the AMSAT-NA 19th Space Symposium and AMSAT-NA Annual Meeting is available from AMSAT and the ARRL.

Inside the HW-7

The HW-7 Heathkit transceiver is a three-band QRP CW transceiver with provisions for built-in VFO and crystal transmit. Band coverage is the CW portion of forty, twenty, and fifteen meters. The transceiver can be operated from the Heathkit accessory power supply model HWA-7, an equivalent low impedance power supply, or batteries. The experienced amateur, QRP man, and even Novice will all appreciate the dependability and versatility of this transceiver.

Whether you use it for standby, camping, emergency operation, or as your primary rig, the transceiver will prove its worth. Band changing and tune-up are easily accomplished with push-button band selection and single-control tuning. The lightweight and compact transceiver has push-button crystal transmit provisions for the Novice or QRP roundtables. Main tuning is accomplished through a 6-to-1 vernier that is virtually backlash-free. A relative power meter, built-in sidetone, and carry-along size make the transceiver a pleasure to operate.

The HW-7 started the famous Heathkit QRP series. Of all the QRP transceivers made by Heath, very little is said about the HW-7. The HW-7 was Heath's first entry into the QRP fray.

Although the HW-7 did perform to specifications, the main fault in the rig centered on the receiver. Like its brother, the HW-8, the HW-7 uses a direct conversion receiver. And, there's nothing wrong with a direct conversion receiver, provided it is of a good design. Unfortunately, the HW-7's receiver is not that blessed.

Receiver overview

The receiver in the HW-7 is unbelievably simple. A dual-gate MOSFET is both the front end and mixer. Signals from the antenna are dropped directly into the MOSFET via a brute-force tuned circuit.

The output of the VFO or crystal oscillator is also routed to the MOSFET. Here the two signals are mixed and the resultant audio is applied to a simple LC tuned circuit consisting of L14 and C5, C7 and C9. It is these components that provide the selectivity of the radio.

After the audio filtering, the audio signal is then routed directly to the audio amplifier. This amplifier boosts the signal up to headphone volume.

The transmitter

The transmitter is just about as simple as the receiver. The same VFO or crystal oscillator is coupled to the doubler/tripler before the signal is sent to the transmitter driver.

From here, the signal is amplified up to about two watts by two RF transistors running in parallel. Low pass filters that are selected by the proper push-button filter the output of the transmitter.

All in all, the HW-7 is about as simple as you can make a transceiver. And it is this simplicity that hurts the HW-7. In fact, Heath could have not chosen a worse device than the 40673 dual-gate MOSFET used in the receiver mixer.

HW-7 fixes

There is really nothing you can do to improve the receiver in the HW-7 short of tearing out the entire circuit and starting over. You can sometimes get better performance if you use a resonant antenna coupled to an antenna matching circuit. Between the two, the extra tuned circuits will help prevent unwanted signals from getting into that dual-gate MOSFET.

To reduce microphonics and hum pickup from the audio circuits, run the HW-7 from a battery supply.

This holds true for the HW-8 as well. The direct conversion receivers can suffer from the AC pickup from a line-operated supply.

Modifications to the HW-7

Even though the receiver is such a poor performer, there are very little in the way of modifications that can fix it. Generally, the only way to improve the receiver in the HW-7 is to tear it out and start all over again.

If you want to try your hand at improving the HW-7's receiver, I would suggest you scrap the MOSFET and try using a doubly balanced mixer such as the SBA-1. You more than likely will need to add some impedance matching transformers between the mixer and the VFO/antenna input.

An additional stage of low-level audio amplification would do wonders as well. By using either a low-noise op-amp such as the LM301 or a pair of transistors, the additional gain would be a great improvement.

The only problem with incorporating any of these ideas? They are not a drop in fix. The majority of the receiver would have to be scrapped, and new circuit boards designed and installed. It's not a task for the weak at heart. So, for the majority of HW-7s out there, the receiver is exactly the way Heathkit designed it.

Playing with the audio

Because the selectivity of the radio is generated inside the audio chain, and since the audio circuits are very simple, you could spend a rainy afternoon experimenting with the circuit.

As designed by Heathkit's engineers, the LC components are very simple. A 200 μ H coil and some capacitors do the work. Mouser Electronics handles a line of high

Continued on page 59

The CSS Safetenna

Choosing an antenna can be a tricky task. There are so many aspects to consider. Do you need a single antenna that can be used on many frequencies? Maybe you want one that is more limited in bandwidth but that does a specific job on one frequency. It's bad enough that the decision can be somewhat daunting, but put a group of hams together and you'll hear a variety of conflicting opinions as to what is best.

From my perspective, the key question about antennas is what I expect the particular antenna to do. If I were getting serious about contesting and DX, a log periodic or stacked monobanders at a couple of hundred feet would be my deal. If I'm trying to maintain peace in the neighborhood, a dipole may be a better answer. When I was living in an apartment, a rail-mounted mobile antenna on the balcony was about the only choice I had. In each case, the key issue was how much functionality could I get with the constraints I had to face. Like the third law of thermodynamics—there's always a trade-off. Bigger is better, but there are costs, in terms of both finances and effort that come into play.

The ultimate trade-off situation is operating under emergency conditions. It is generally accepted that a bare handie-talkie with a rubber duck antenna is not going to make it when facing a major disaster. This was proven out, unfortunately, at the World Trade Center. Reports are that amateurs quickly realized that about 25 watts with a decent quarter wave magnetic mount antenna was necessary to maintain communications. Similarly, when a repeater was knocked out of commission, an order for firefighters to clear the building was not heard, increasing the casualty count. In an ideal situation it would be preferable to be able to work stations direct, but this is not always realistic. In any case, if the antenna provides some degree of gain, you may be able to reduce power and extend your on the air time when using emergency power.

What type of antenna would you expect to need in an emergency? If you are working mobile from your own vehicle, there is normally no problem. Often you will be

expected to operate from another vehicle such as a Red Cross or Salvation Army car or van. This may be quite beneficial since you really don't want to drive your own car through a debris field, but it will require moving radio and antenna. Here, the choice is easy—the highest-gain two-meter antenna on a magnetic mount. While having an antenna tuned for both two meters and 440 MHz is optimal, normally there is not a problem operating 440 MHz into a two-meter antenna.

If you are going to be operating from a static location, however, the choice becomes a little more difficult. Solid walls make great

RF attenuators, so ideally you would want the antenna outside or as close as possible. In a best-case scenario, buildings designated as shelters, hospitals, and public service agencies would have a permanently mounted antenna with a cable fed to the preferred ham radio operating position. Unfortunately, for every well-planned emergency location, there are many that are not so equipped.

I've tried a number of variations to make do under adverse conditions. I've used a magnetic mount stuck to the top of the mobile rig. I've attached a mag mount upside down above the drop ceiling



Photo A. Here's the long and the short of it. Safetennas come in both 25-inch and 60-inch sizes.

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attached to a heating duct. I've tried J-poles, dipoles mounted vertically, and everything else I could think of. I never did find quite what I was looking for. Now there is an antenna made for such

occasions that seems to fill the bill quite nicely. The Safetenna from Creative Services Software (CSS) is an interesting approach to provide an answer for these types of problems.



Photo B. Even right out in the open, the Safetenna in my office doesn't seem too intrusive and provides good coverage for all the local repeaters.

Designed by Mike Thigpen AB4MT, the Safetenna was intended to provide better coverage under adverse conditions. Mike envisioned it as easy to keep in the trunk or under the seat of the car with string and coax so that it could be put into use when the handie-talkie and the cell phone just wouldn't do the trick.

The Safetenna comes in two models. The compact is 25 inches long and is intended for two-meter use. The full-size antenna is 60 inches long and can be used on both two meters and 440 MHz. Both units are constructed within a PVC pipe to keep the units protected and dry. At one end is a loop that can be used to hang the antenna. At the other is an SO-239 connector.

The larger Safetenna appears to have about 3-dB gain as compared to a quarter wave vertical. I conducted my own tests (with extremely limited and crude methods) to see how the Safetennas performed as compared to a rubber duck. At lowest power I measured the field strength with each antenna. I was able to get the same reading by adjusting the distance.

The rubber duck reading was at four inches, the compact Safetenna gave the same reading at 23 inches and the full-size Safetenna gave the same reading at 27 inches.

With recent events, I have the full-size Safetenna in my office hooked to my trusty old Icom 3200A. Working in a hospital, I may do double duty as both communicator and in support of the Radiology Department. I can hit all the repeaters I expect to need with this combination, so I know it meets my needs. A bent paper clip keeps it attached to the ceiling grid — now that's what I call easy to install.

These may not be the highest-gain antennas in the world, but for ease of use and durability, they belong in your grab-and-go kit. Both Safetennas retail for \$39.95 and can be ordered directly from CSS at Creative Services Software, 503 W. State St., Suite 4, Muscle Shoals AL 35661; tel. 256-381-6100; [http://www.cssincorp.com].

January oops!

Everything about our January article on A&A Engineering's Smart Battery Tester was pretty smart, except for the dumb way in which we forgot to provide contact information: 2521 W. LaPalma #K, Anaheim CA 92801; tel. 714-952-2114; [www.a-a-engineering.com]. Sorry about that, to all!

Bumpiness

Personal satisfaction aside, those of us who have discovered the joy of getting our computers and rigs to talk to each other have a responsibility to assist one another over the bumps. Fortunately, we have quite a number of hams assisting us as they write the programs they so willingly share.

You may recall my dilemma with the Millennium Edition (Me) operating system. I have threatened, almost daily, to change to the XP system, but have put it off until I can be reasonably sure the computer will not lose even more compatibility with ham programs. So, this month, I am experimenting with different software to see what really works.

Believe it or not, some old standby favorites of the ham community are working on this machine better than they did using Win95 in the slower CPU. Sometimes there is just plain trickery afoot that does not explain well.

I mentioned a few months ago that the old tried-and-true Word 6 which was written for Windows 3.1 was working but having hiccups. Problems included no Spell Check, and then I noticed the Help file would not activate either. More dilemma.

It was finally decided to leave Microsoft's Word programs in the ditch they dug for them and install a copy of WordPerfect 8 I had available. Best idea in ages! Everything works, does not require an Internet browser to be in place, plus many of the shortcut keys are the same as what I was used to. Microsoft simply shot itself in the foot on that one. I am converted.

While searching for reminders of possibly forgotten software I visited the G3VFP Web page (see the lower lines of The Chart for new listing). There are always things to learn as these busy programmers and engineers keep producing new goodies for us. I recommend a trip there for anyone looking for ideas.

Dave has assembled a digital ham resource as nearly complete as it gets. He has grouped hardware and software by categories. Software includes DOS and Windows

utilities, logging, rig control, soundcard programs for CW, PSK31, Hellschreiber, MT63, Throb, SSTV, Wefax, plus software for the Linux and Mac operating systems. I think the only questions left unanswered are those with no answers or for questions that have not been asked.

Speaking of listings, I received a note from Bob WA2HNG, concerning some inactive listings in The Chart. I tried them and, sure enough, they needed modifying or removal. What you see today is a few months after the fact, but the Chart on the Web (see **Table 1**) was updated in December.

One of the reasons I mention these things is I notice hams on the air referring to the "info in 73 mag" and, of course, hams contact me directly to ask about discrepancies. There are times when sites don't respond but they are still there for such reasons as a server is down, or a site is moved to another server and the notice expires.

Often, the answer is simple. Sometimes it takes a bit of legwork, but the ham community seems to appreciate a printed listing such as this and I am glad it is useful — also that 73 continues to make it possible. Once in a while, I get a note from a ham that has a URL that does not work and I find he has simply missed inserting a character.

That is so easy to do and I really understand. The advantage I have here is that I can copy and paste these addresses from my word processor file directly into the browser and that works. That is hard to do from a magazine listing.

Back to ham stuff. As I mentioned previously, using Win95, I had problems with a few of the old standby PSK programs so many hams were using successfully. So I have been experimenting with some of this

software in the Me operating system. This is a good test and enlightening to me.

I installed Moe Wheatley's WinPSK, ran the setup (where crashes used to occur), got it on the air and made my way through a QSO, building macros as I went. Worked like a dream. Chalk up one for an old program that fit the Me profile just fine.

Instant success s-o-o-o easy

Then, I tried a variation of the original in the WinPSKse format from Dave KA1DT, and it not only worked, but the first or second station identified on the monitor was in South Africa. I did a quick audio drive check, altered a few macros, gave him a call, and Bingo! I worked the first PSK signal I recall from that part of the world.

I call that an easy setup. Install, tweak, and work instant DX! What a way to live. Sparks the enthusiasm. I guess I really should not give all the credit to the program. Being in the right place at the right time has a lot to do with such a phenomenon, but it was a good result for what could have been a hum-drum experiment.

The WinPSKse freeware in the screen-shot image is a remarkable offering. The author did a bang-up job revamping the original WinPSK package, including a mini-log that can be imported directly to a logging program, and added a second receive pane so two signals can be monitored simultaneously.

I spent a little more time with the WinPSKse and became fascinated with all that is built into it. At first glance, I felt it was pretty barebones but it is well thought out for ease of use and some special applications.

The Help file is, simply stated, excellent. Just about every question I had could be answered simply and quickly with a trip

through Help. In there, you will find instructions for cable connections to interface your rig to the computer soundcard as well as a schematic for a PTT circuit for the serial port, plus just about anything you need to successfully operate this program.

One thing I did not find readily in Help was where to find capability for more than one set of ten macros. Clicking the arrows directly under the defined function keys on

the monitor revealed three more sets of ten, making a total of forty macros available for definition, much more than I ever use.

In the General Setup under the Settings pull-down I found a Rig Control tab. Clicking that brought up the possibility of controlling the Small Wonders Lab PSK 20/40 rigs directly from the software. That is the only rig control scheme available at this Version 2.23 offering, but more are promised at a later date.

You have the choice of clicking on the macro buttons on the screen to activate them, but I really appreciate the Function Key option. I especially like the buttons labeled with the F-Key ID, the macro title and, if you wish to be sure what you are about to send, you can rest the cursor on the button and the tool-tip, if activated in the setup, will display the contents of the macro. Of course, it is still not foolproof, which I managed to prove, but that was my own clodlike approach which I will not discuss here.

There is one error (oversight) I will admit to. It came during preparation for taking the "perfect screenshot." I realized as I looked at the background colors in the transmit and receive panes that they would present a distracting combination when printed in the gray scale in the magazine. The backgrounds were very dark and the text was light.

You will find there is a pretty fair selection of colors for help in this area. Also, you can select different fonts as available from your other program installations. So I thought this was a natural and tried black text on white background and ran into trouble immediately. I retraced my steps and changed one of the receive panes so I could observe what was happening.

If you insist on using black text, you will discover you are not able to find the crosshair cursor in the waterfall because there is no way to change the background color in the waterfall and the crosshair matches the received text color. Black on black doesn't compute to the eye.

So the color combo I chose is an imperfect compromise at best, but helps make a decent screenshot. If I were not snapping a picture of it I would have left it alone. (See the text under the screenshot.)

Zoom isn't just about speed

Now for the error. I paid so much attention to the colors that I overlooked a really good feature in the waterfall. The width is adjustable with the Zoom control located just below the waterfall. If you study the numbers at the left and right of the waterfall display you can calculate there is 3,200 Hz displayed, which makes the traces just a tad cramped.

One click on the zoom spreads this display out to just 1,600 Hz. More choices are available, but just the one step makes it much easier to select the trace you want to copy. I have to say this about WinPSKse. It was virtually no problem to select a trace and have it "lock" on the

| Source for: | Web address (URL): |
|--|---|
| Mix W2 Soundcard program for PSK31, RTTY, new modes, MTTY, FSK31, more | http://tav.kiev.ua/~nick/mixw2/ www.nvbb.net/~jaffejm/mixwpage.htm |
| FREE MMHam site — MMTTY — MMSSTV | www.qsl.net/mmhamsoft/ |
| FREE VK7AAB — SSTV-PAL — PSK-PAL | http://users.origin.net.au/~crac/ |
| Much ham info w/SSTV downloads | www.conknet.com/~kb1hj/index.htm |
| TrueTTY — Sound card RTTY w/ PSK31 | www.dxsoft.com/mitrty.htm |
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| PSK31 — Free — and much PSK info | http://aintel.bi.edu.es/psk31.html |
| Interface for digital - rigs to computers | www.westmountainradio.com/ |
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| MFSK-related tech info — how it works | www.qsl.net/z1t1bpu/ |
| Throb — lots of info | www.lsear.freemove.co.uk/ |
| Download Logger, also Zakanaka | http://www.qsl.net/kc4elo/ |
| PSKGNR — Front end for PSK31 | www.al-williams.com/wd5gnr/pskgnr.htm |
| DigiPan — PSK31 — easy to use | http://members.home.com/hteller/digipan/ |
| TAPR — Lots of info | www.tapr.org |
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| ChromaPIX and ChromaSound DSP software | www.siliconpixels.com |
| Creative Services S/W Multimode w/PSK | http://www.cssincorp.com/products.htm |
| Timewave DSP & AEA (prev.) products | www.timewave.com |
| Auto tuner and other kits | www.lgdelectronics.com |
| RCKRtty Windows program with free DL | http://www.rckrty.de/ |
| SV2AGW free Win95 programs | www.raag.org/index1.htm |
| Source for BayPac BP-2M & APRS | www.tigertronics.com/ |
| Int'l Visual Communications Assn. — nonprofit org. dedicated to SSTV | www.mindspring.com/~sstv/ |
| Hellschreiber & MT63 & MFSK16 (Stream) | http://iz8bly.sysonline.it |
| HamScope — multimode w/ MFSK16 | http://users.mesatop.com/~ghansen/ |
| YPLog shareware log — rig control — free demo | www.nucleus.com/~field/ |
| WinLink 2000 System info | www.winlink.org/k4cjr/ |
| Another GREAT Web resource | www.g3vfp.com/ |
| Airmail — free program to use WinLink 2000 | www.airmail2000.com/ |
| WinPSKse — PSK31 freeware | www.winpskse.com/ |
| The Chart NOW ON THE WEB | www.geocities.com/normandy214/ham_radio.htm |

Table 1. The infamous chart.

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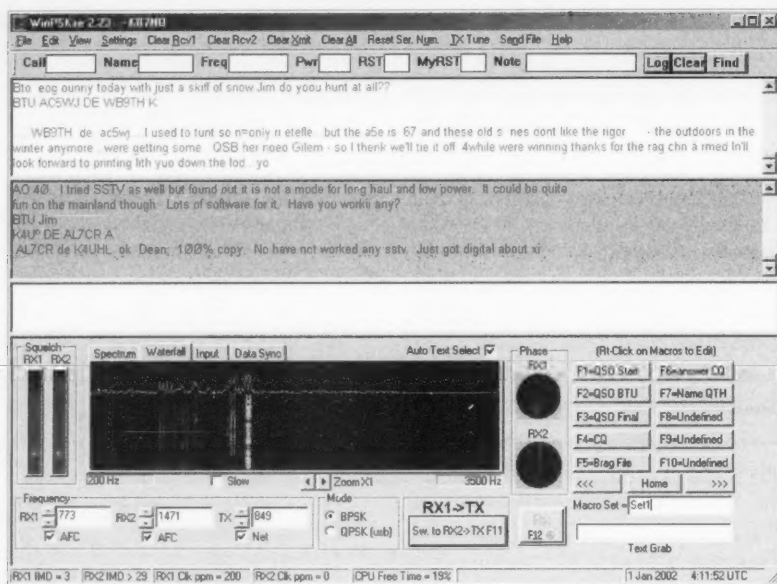


Fig. 1. Screenshot WinPSKse is a popular freeware offering, and the more I worked with it the more I could understand users' loyalty. This software is a modified version of the original WinPSK by Moe Wheatley AE4JY. The added "se" denotes the special edition by Dave KA1DT, who created a very user-friendly ham program. Two receive panes simultaneously display incoming signals. Left click your mouse button for RX1 and right click for RX2. The active panes are easily swapped by clicking either the mouse button below the waterfall or (easiest way) hit F11. F12 toggles xmit and rcv. The background color lightens in the active pane to reduce operator confusion. The macros, 40 available, are a snap to write and are well defined and easily activated with the function keys. Note the IMD readings at the bottom are simultaneously displayed for both incoming signals. The mini-log will keep track of your activities and is saved in ADIF format. There is rig control available for the PSK20/40 rigs from Small Wonders Lab. Nice touch for the QRPer. Another feature, and one I didn't set properly for this shot (see text), is the zoom on the waterfall. This software has, in my opinion, about as much convenience built in as the casual digital newcomer will require and it will all fit on a floppy disk. Included is a great Help file. A very thorough offering, and simple to set up and get going.

THE DIGITAL PORT

continued from page 48

signal, first try, every time with the signals all scrunched up as they were in the screenshot. Probably why I didn't think to click the zoom.

The mini-log saves in ADIF format. I took a look at the automatic file it created and it looked correct, at least at first glance. I attempted an import into Logger and it recognized the file was there, but did not import the info. I have not dwelt on this, but it would be worth finding the reason if I were to continue using the program. However, you can find properly saved, previous contacts and display them directly from the WinPSKse log, which is what most logging is about.

I still amaze hams who have not gotten into the computerized logging when I tell them on the first exchange when we worked before. There are so many digital

logs available that work well, it is just a matter of picking one and getting used to it.

A little editorializing ... and a project

It occurs to me there is an underlying reason why these various Windows operating systems react to ham software the way they do. It really is not the will of Microsoft to cause hardship on the ham community. The folks up in Washington state barely know we exist.

The real problem is most of the owners of these machines use them as toys. I mean to play music, games, visit chat rooms, and "cruise the Web." Somehow, other than writing a few letters occasionally, most users, different from you and I, seldom have a complaint that cannot be addressed with the purchase of a room-filling speaker system.

I am a little hard on those people, which is unfair. It is really an age-group thing now

that I think about it. I was making some blanket statement to a ham over the air concerning these things and he, being younger, reminded me of that fact by informing me he also used his computer for those other obscure purposes just mentioned.

One more thought on users and age groups is an observation of computer literacy. I was sitting in a room the other day with some folks old enough to have teenagers and perhaps a bit older who admitted they relied almost wholly on their kids to do the E-mail in the house. I have no idea what the parents with those computers use them for if left alone in the room with the intimidating little machines.

What I am getting at is that the architecture of the hardware and software is satisfying the needs of the masses, and we must learn to cope. Coping means finding the right combination to resolve our individual situation. And the more things you do with your computer the more complex it becomes to find those combinations.

It wouldn't really be an advantage to have a computer set up to do only ham activities. Several reasons for that come to mind, not the least of which is expense and being tied to a computer guru to solve your every problem whereupon you would spend the money you should be spending for towers, digitally controlled rotators, and other necessities of life.

The most important reward for understanding how to make your computer do what you want it to do is that you can make changes and update to newer versions of software as soon as it becomes available. You can control the outcome of your computer experience.

Next comes the project.

I just purchased a big book on the Linux operating system. There are tons of free information available on the subject, but it appears the book form is better organized and more concise. We shall see. This was a step I had anticipated for some time and, while looking through Dave's G3VFP Web site, I ran across several ham applications available for Linux.

I asked Dave if he had set up Linux as yet and he said he has given it a spin and seemed positive. So that was favorable. It looks as though a lot of work has been done over the years to cause the system to be user friendly and perform the tasks we expect a computer to do. At least that is the impression I got from thumbing through the book.

The plan is to get some experience and, of course, road test the ham software. Lots

Continued on page 59

HOMING IN

Radio Direction Finding

Joe Moell P.E. K0OV
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T-Hunting Fun in the Sunshine State

Spring will soon be here, so clubs around the country are already planning hamfests and other outdoor activities. Many of them are beginning another season of hidden transmitter hunting. They'll be doing it in vehicles (T-hunting, rabbit hunting) and on foot (foxhunting, radio-orienteering, ARDF). Will your club be among them?

I enjoy hearing about radio direction finding (RDF) contests all over the USA and the world. Like snowflakes, it seems that no two are alike. Every group has its own idea of the perfect set of rules and boundaries for mobile T-hunting. This month, let's see how it's done on the coast of Florida.

The mention of Daytona Beach brings up visions of race cars and sandy beaches. If you're one of the eight million who visit there in any year, you'll find both of those, and hidden transmitter hunting too. It's a year-round activity for the Daytona Beach Amateur Radio Association (DBARA).

Bunnies and cowbells

According to Bruce Kalashian KB4GW, "As best I can remember we started about 1980. John Pease WB4VJZ got the idea and passed it around. We all went to work building our first antennas with the help of Bill Schwartz WA4JCP and Bob Haviland W4MB. The first attempts were quite primitive and admittedly mine didn't work very well. I think it was an Adcock-type system and I don't think it was fed properly.

KB4GW continues, "Dave Rusler WA4ZTT hid under the Main Street bridge in a boat, waving an 11-element beam all over the place. One hunter spied him under the bridge but couldn't get to him, and Dave would not admit he was the rabbit! I understand that after some 'extraordinary methods' he finally confessed. There are no witnesses to what the threat was."

Everyone agreed that this hunt was too difficult for beginners, so the club made hunt rules that required consistent power and a stationary transmit antenna. "The idea was to get the wives to meet everyone and have some fun being out with ham radio," says Bruce. "We decided that the winner of

each hunt would hide next and host a social event afterwards. It was a good idea, but there weren't too many different winners during that time, so a few hunters got the brunt of all the socials.

"As time went by, we had more and more

folks hunting, so the gatherings got really big. We went over to Orlando and hunted with the guys over there. At times, 40 or 50 people would show up, four or more in a car. That made it tough on the pocketbooks.

"It became necessary to make a rotating

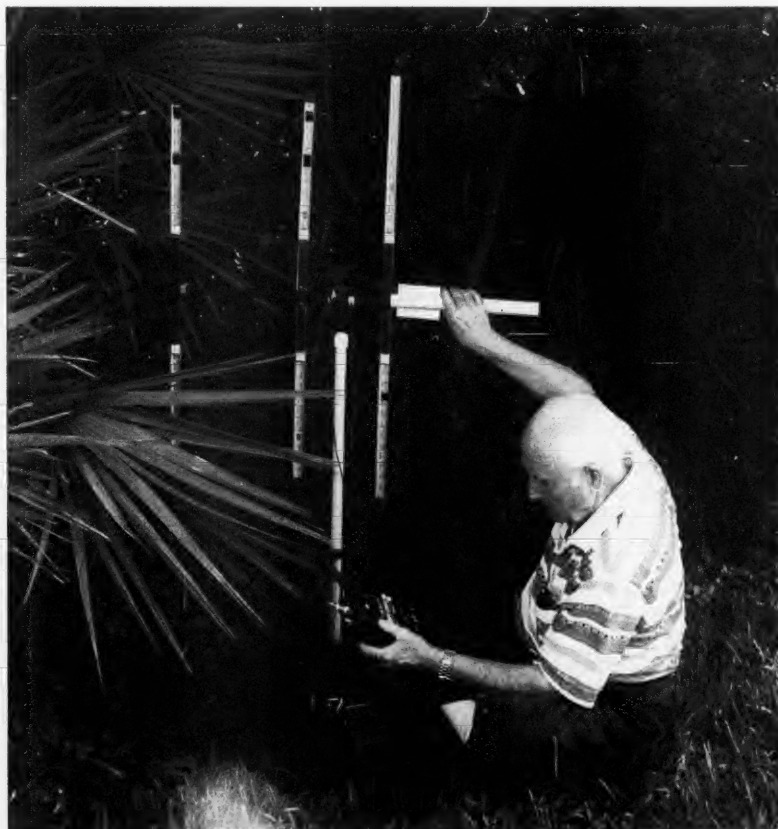


Photo A. Hider John Munsey KB3GK checks the SWR and pattern of his tape-measure beam just before the hunt starts. The strong signal in front of his beam will entice the hunters to come in through a swamp instead of a dry route from the back. (All photos provided by KB3GK)

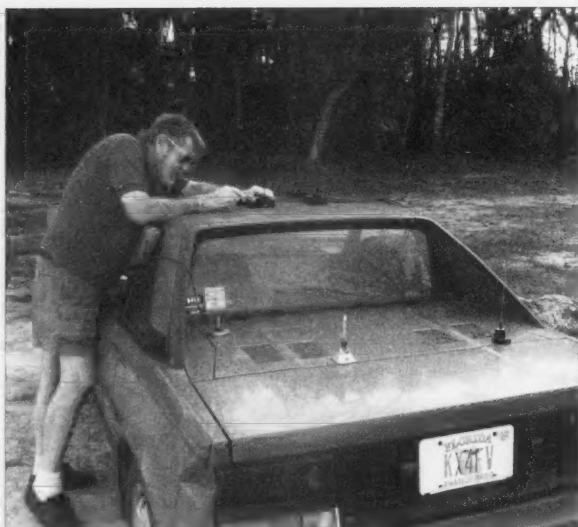


Photo B. Fred Villers KX4FV makes last-minute adjustments to the placement of his doppler whips.

list of who would hide next. That way everyone knew when they were 'up,' so to speak, and could plan for their social. As a

hunters to find him. Of course, more attention was paid to the team getting the cowbell than to the one winning the stuffed

trophy, the winner would get a stuffed bunny to keep until the next hunt. Sometimes, the bunny didn't come back because folks would forget to bring it or drop out of hunting. Then we'd get another bunny.

"Next came the cowbell. One hunter got lost during a hunt and had to be tracked by RDF to get him out of the woods. Awarded to the worst-performing hunter each time, the cowbell would make it easier for the rest of the

bunny. Strangely, the cow-bells often disappeared.

"On a hunt in Seminole County, WB4VJZ drove up a driveway that didn't look like one and found himself staring down the barrel of a gun! A couple of shots into the air made his vehicle back out rather quickly. This led to a rule that the transmitter must always be on property accessible to the public, leaving no doubt at all for the hunters.

"On another hunt, Mark Patterson N4HFS drove onto the interstate to try to find the transmitter and had a small but serious enough accident to cause us to make another rule: 'It's not on the interstate, even if you think so.'

"Then, when I was hiding by the Port Orange Causeway,

WA4JCP found the fishing pole that held my antenna, but could not see me. He just grabbed onto the coax and pulled it to himself. My radio jumped out of the hiding place and I was found. So now comes another rule: 'If you find the antenna, you have found the hider.'

"During the beginning hunts, WA4JCP and his partner thought it would be a good idea to have a field strength indicator. Trying to see a panel meter in the dark would be tough, so they built a voltage-controlled oscillator, fed with a detector to sound off when the signal was close, and to indicate which direction.¹ That little thing became the most important tool for close-in sniffing. We all built one and learned a lot about construction, with help from the designers.

"Then came the doppler. WB4VJZ built the first one in Daytona Beach. The rest of us thought we were all done, and that there would be no way to fool that thing. Well, it didn't pan out that way, though it let hunters keep their hands inside the car. As always, the hunts were won using good DFing techniques, no matter what equipment."

All the T-hunting action in Daytona Beach led to hunts beginning in Orlando and at the Melbourne FL, hamfest. According to KB4GW, the Dayton hunters who participated won these hunts almost all the time. Any rebuttals to that claim?

What's your handicap?

My most frequent Florida T-hunting correspondent nowadays is John Munsey KB3GK (**Photo A**), who usually teams up with Bill Thomas KE4HIX. John writes that hider-hosted socials are a thing of the past. For the last three years, the hunters have gathered at a restaurant near the hidden transmitter instead. Gone also are the requirements for stationary antennas and steady power. "After all," John writes, "a malicious jammer would not follow such rules, so why should we limit our foxes?"

DBARA sponsors a hunt about once each month. There is no fixed schedule because special events, car races, and Spring Break have a great effect on traffic. Those dates are avoided in the interest of safety.

According to KB3GK, "Most of our hunts are at night and are a combination of mobile and on-foot. Usually the hider's plan is to lead the mobiles into an area where the on-foot hunting will take place, such as a park. Most parks in this area officially close one hour after sunset to reduce crime and prevent them from being used as campgrounds. Fortunately, the local police have been cooperative by extending that time whenever requested. Of course, if we post



Photo C. Arthur (KA4WDK) and Victoria (KB4KVP) Byrnes mount their doppler antenna set on the back of the vehicle, with help from young AJ.

a sign at the entrance to announce extended hours, it's a giveaway.

"To even the odds, the winner of a hunt has a five-minute handicap on the next hunt," John continues. "To lose the handicap, that hunter has to be second or worse in the next hunt. If he wins again there is an additional five-minute handicap. These handicaps continue until the hunter loses a hunt. Some hunters have won with a fifteen-minute handicap.

"We have two five-watt foxes built into ammo boxes. They usually run one minute on and two minutes off. We also have four smaller foxes using Alinco credit-card-size radios at 200 milliwatts output that are controlled with PicCon controllers.² In addition, we have PicCon controllers for both Kenwood and Icom mobile radios for the longer-range hunts.

"Dopplers are very popular among Daytona hunters, including Fred Villers KX4FV (**Photo B**), the Byrnes family (**Photo C**), and my team. On the other hand, Pat Eckenrode AC4QM (**Photo D**) and John Greiff N4UJU (**Photo E**) insist that quads are the only way to go.

"On foot, several of us use the tape measure antennas from the Web site of Joe Leggio WB2HOL.³ Rather than build with PVC pipes, some hunters use wood dowels, as they are much lighter (**Photo F**). We also have two of the HB9CV antennas from Ron Graham as well as a special one he made for the 70 cm band."

KB3GK and KE4HIX hid the December 2001 hunt. "It was planned to be tough," reports John, "but things don't always go as planned. The first transmitter, running 750 milliwatts into a J-pole antenna, was at the boat ramp in Bethune Point Park. We expected this transmitter to be easy to find, but it would scatter the teams so that they could not 'follow the leader' to number two. As it turned out, number one gave hunters the most trouble, taking them almost two hours to complete what was expected to be a 20-minute hunt.

"Both hunting teams drove into the park at least once, looked for the antenna but failed to find it," John continues. "They both passed within 25 feet but the transmitter was cycled off and they missed it, even though Bill was parked in his white Jeep in the middle of the parking lot for all to see. We suppose that they were thrown off by the signal not being near the vehicle and thought it was a decoy.

"The park officially closes one hour after sunset. We had contacted the police and received an OK to stay until 11 p.m., if necessary. We prepared a handout clearly



Photo D. Pat Eckenrode AC4QM is close to finding another transmitter in the woods with his strung-wire quad.

stating that we would be in a semi-private area but that we had permission to be there. However, we failed to cover a sign on the gate at the entrance. Although hunters came and went they were uneasy about entering the park after the sign said it had officially closed.

"This transmitter was finally found when one hunter returned to the boat ramp to answer a 'call of nature.' While doing so, he looked up and saw that he was standing beside the boat ramp sign and that the J-pole was mounted on top of the sign. The second team was given some hints so that they could find it and everyone could proceed to hunt number two.

"The second transmitter was near a church on the east bank of the Halifax River. This mini-fox ran 300 milliwatts and was attached to the end of a pier. Both teams found it within forty-five minutes of finding number one. Hunters said they thought at first that it must be in the middle of the river, but were soon able to locate it without much trouble. So much for planning a tough spot!

"The team that found number one first was last at number two. The team that was last at number one was first at number two. That team had been given a strong hint as

to where number one was located. Was this a standoff?"

Join the Fun

As this issue of 73 goes to press, John and Bill are putting on a transmitter hunt for the Orlando HamCation hamfest. "It draws hunters from all over the southeast and from as far north as New Jersey," says John. "We have won three times in the past four years and the year we didn't win we were the hiders. We have not developed plans for 2002 yet, but will do as much as we can to make it difficult."

DBARA hunters continue to promote T-hunting elsewhere in the Sunshine State. "Lake County is trying to renew their activity," KB3GK reports. "Bill and I have been asked to help. We will show them our equipment and organize a building class to get them started."

Next time you're on Florida's east coast, get together with the DBARA hams for foxhunting fun. They are on the lookout for new hunters, because three teams from Embry Riddle Aeronautical University recently graduated and moved away. "We will help anyone interested in transmitter hunting with the building of equipment and basic training in hunting skills," says John. "You

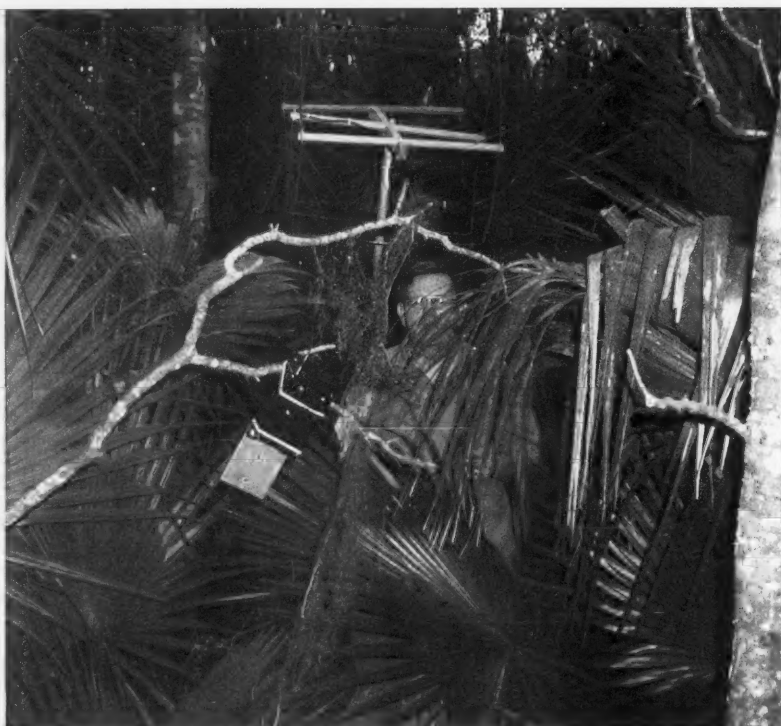


Photo E. John Greiff N4UJU crashes through the palms to find a hidden transmitter with his well-worn stiff-wire quad.



Photo F. Arthur Byrnes KA4WDK and son AJ (behind the park bench) do practice hunts like this to check their steel-tape beam RDF setup.

can log onto the DBARA Web site [www.dbara.org] and leave a message. Daytona hunt dates and details are posted on this site, too."

If you don't live on the sunny Florida coast, get together with hams in your own area to start the ball rolling. Don't be intimidated by your local RDF "experts," because with just a little effort, you can be competitive, too. According to KB4GW, "Everyone makes mistakes. The team that wins is the one that makes the fewest on that day. We have all been very good and very poor. It is a very active way to enjoy ham radio. It started me on the road to building and learning about electronics, and it provided fellowship with other hams that I might never have known otherwise."

What's unique about the T-hunts in your area? Let me know and I'll spread the word here in *73 Magazine*. Your hunt photos are always welcome, too. Send E-mail and postal mail to the addresses at the beginning of this article.

Footnotes

1. Construction plans for field-strength meters, including a voltage-controlled oscillator version, can be found in the book *Transmitter Hunting — Radio Direction Finding Simplified* by Moell and Curlee, published by TAB/McGraw-Hill, ISBN number 007-1560068. This book also includes plans for a doppler RDF set, and strung-wire and stiff-wire quads.

2. Available from Byon Garabrant N6BG, 8378 Granite Mountain Lane, Las Vegas, NV 89129 [<http://www.byonics.com/>].

3. For links to the WB2HOL antenna projects and the Ron Graham HB9CV antennas, see the "Equipment for Radio-Oriented" page of the "Homing In" Web site [www.homingin.com]. 73

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Say you saw it in 73!

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Elmers Applaud Ham Ambassador Program

Progress!

Ham instructor William Alber WA6CAX has just completed another successful Technician class with public safety and search and rescue personnel, and offers the following comments for any new Elmer: "Start off that first class with glossy color frequency charts and maps at each table and chair."

I start out with a tape-recorded tour of the radio spectrum, and I zero in on the ham bands that they see right on their manufacturer-supplied band charts," adds Alber, pointing out the large map from Yaesu, Kenwood VHF/UHF band plan color chart, and Alinco and Icom America frequency privilege charts.

"For every class session, the students sit down in front of new manufacturer-supplied materials," he says. Alber has found dealer catalogs from Ham Radio Outlet, Universal Radio, and Amateur Electronic Supply to be very useful. Occasionally, ham hats and ballpoint pens are available, too.

"At graduation, our students receive a \$20 gift certificate from Icom America on any new Icom radio from an authorized Icom dealer, plus a colorful graduation certificate from our textbook supplier, W5YI Group. Our students could also receive a free ARRL book if they would sign up for League membership at the conclusion of our class, and giving out magazines from the publishers is another great way to keep their interest high throughout the entire course," adds Alber.

Manufacturers and ham dealers are endorsing the Ham Ambassador free training materials program because it allows them to get their expensive educational/promotional materials in the hands of brand-new students who have yet to buy their new ham radio.

"While the brand-new students may appreciate our charts, it is the ham Elmers and instructors who probably

appreciate them more," comments one manufacturer's representative.

"And if that ham instructor appreciates what we are doing for him or her, no doubt they will be promoting our brand of equipment to those students ready to go out and make a purchase."

From what Icom America tells me about their glossy stock band charts and maps, plus their \$20 graduation



Photo A. Live, operating radios are a must!



Photo B. In the classroom, too, you need a live radio — here, a 10m Ranger.



Photo C. Present lots of show-and-tell electronic parts.

gift certificate, the Ham Ambassador free-materials program is working swell.

The W5YI Group goes one step further and may supply an instructor's no-code Technician time-line teaching guide that keeps the instructor on track, and gives the instructor some handy demo ideas and demo sources that have made my Gordon West Radio School ham classes a nationwide hit.

Instructors may purchase W5YI books, tapes, and computer training disks at a discount, and with their instructor purchase comes the time-line training guide written by this author to point out some of the sources of demo materials, and some of the successes of

using live-action demos to help teach the class.

"I would not have believed that soft foam rubber balls could help explain ground waves, direct waves, and sky waves," smiles Alber, pointing out that the instructor and students had a great time sending balls all over the classroom to depict different types of radio wave propagation.

"But I followed the suggestion in the W5YI no-code Technician class instructor guide, and sure enough, when it came time to show radio waves in action, the demo was a major hit," adds Alber.

Many of the classroom demos are ideas from other ham Elmers across the country. Rick and Lil Marvin,

KL7YF and NL7DL, came up with the described demonstration in the RF safety section on using low wattage light bulbs and low wattage reflector lamps to illustrate antenna radiation patterns. Next, the demo involves having a student come up and the suggestion of whether or not they would like to firmly grasp the lit light bulb and hold on to the hot bulb continuously. Obviously the students would decline.

Would they put their fingers a half inch away from the lit bulb, and hold them there continuously? Nope, the students would claim that this was still too close for "comfort."

Then the Marvins would teach all about RF safety and tell the students that the same principle of getting



Photo D. Use that Slinky to demonstrate frequency and wavelength.

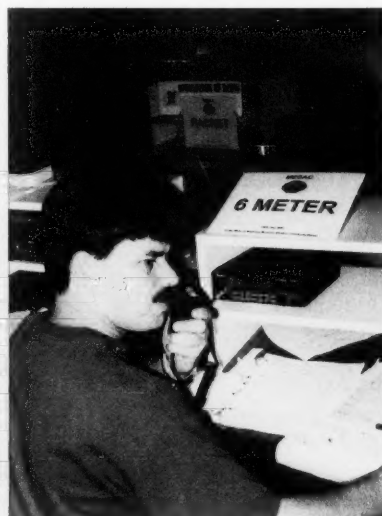


Photo E. Instructor Julian Frost N3JF offers a live demo of 6m E-skip.



Photo F. *The Blazing Pickle is a great AC voltage demo described in the W5YI instructor book.*

burned or overheated by a turned-on light bulb is a good example of getting too close or touching an energized ham antenna during transmit. The reflector bulb goes one step further to show how a yagi antenna may work — all of this is described in the W5YI no-code Technician teaching time table available to instructors purchasing the Gordon West training materials.

The free training materials are available to any instructor who will send in \$5.95 in stamps to cover Express Mail postage for some of the on-hand materials. Since many of the radio equipment manufacturers are West Coast-based, the materials come out of Gordon West Radio School.

At the same time, ham dealers and publishers are notified of a request for

training materials, and these catalogs and sample magazines may be sent out of their headquarters in different parts of the country. The better documentation you might send on your upcoming class, the better the response from ham dealers and publishers.

The Ham Ambassador program wants to help YOU for a successful class because all of us in the industry know the importance of keeping our ham numbers up to hold our valuable frequency spectrum. Now that Federal Communications Commission restructuring leads to a relatively easy and straightforward no-code Technician class path, the industry wants to help YOU attract more ham operators with your classes. More professionally-run classes. MORE HAMS!

The training materials that you give out in class will help promote better understanding of frequencies, band plans, and operating regions, plus put that manufacturer or dealer's name in front of a brand new equipment-buying student. It also gives an opportunity to the W5YI Group to share with you their instructor training materials discount program, plus additional textbooks that may go into even more detail on some of the technical answers behind the questions.

As this Ham Ambassador program matures, it is my vision to work on a program that rewards YOU, the instructor, with a potential of purchasing demo ham radio equipment at an instructor's discount through participating ham radio dealers. I can tell you right now that there are several instructor teams throughout the country that have such well-known ham classes that the local dealers would certainly give them a break on demo gear purchases. My vision is to take this program one step further and have manufacturers work closely with dealers to give those really hot Ham Ambassadors a DEALER EMPLOYEE-type discount on the equipment they plan to use in the classroom.

The American Radio Relay League will reward Ham Ambassadors for taking sign-ups for ARRL membership right in the classroom with either a free book for each student signing up, or a monetary spiff back to the instructor team handling the ARRL membership drive. Keep in mind that the

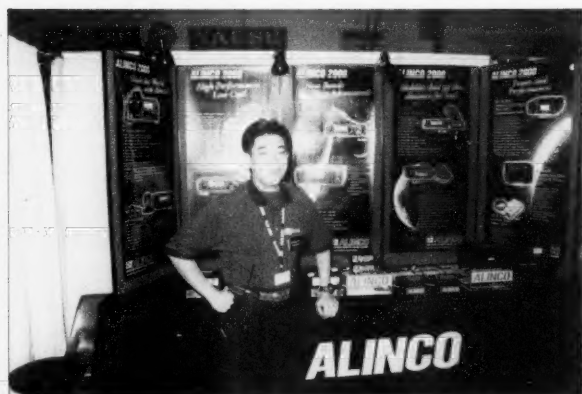


Photo G. *Many manufacturers are ready to help instructors "teach class" with their training materials.*

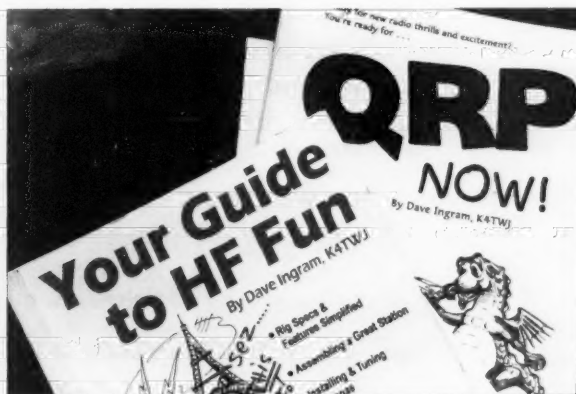


Photo H. *Books from Dave Ingram tie in well with classroom antenna and rig demos.*

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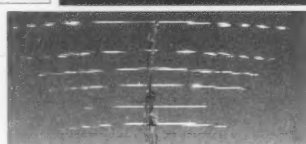


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ARRL has a powerful in-house registered instructor program, and I especially like their video library loan program, offering League-registered instructors over 20 exciting short videos to better illustrate specific subelements out of the question guides.

Sign up now to become a Ham Ambassador, and include with your letter a class flyer on your upcoming course. To start off the flow of materials, include \$5.95 for up to 2 pounds of training materials, and send your request to Ham Ambassadors, Gordon West Radio School, 2414 College Drive, Costa Mesa CA 92626.

Thanks to 73 Magazine for all its support of the Ham Ambassador program, and be sure to let your students know that 73 Magazine is indeed a "must read" every single month! 73

Switched Mode Power Supplies

continued from page 16

MBR1045 Schottky diodes and D3 and D4 are MUR110 ultrafast silicon rectifiers. The MOSFETs, Q1 and Q2, are TEMIC Si4980DY. They have an $R_{DS(on)}$ of about 0.070 ohms and a total gate charge of 15 nC with an 80 volt drain voltage. With a 13.8 V supply, the Miller effect will be less and Q_T correspondingly less.

Fig. 6 shows an SMPS with an output of 28 volts at 1 ampere. The line regulation is about 14 mV while the load regulation is about 3 mV. The efficiency is about 70%. 73

Vent-a-Fume

continued from page 18

cabinet to protect your work surface from scratches and to prevent the unit from vibrating across the surface of the bench.

Wiring completed, metal pieces assembled, and suitable duct hose attached, your new fume removal device is ready for operation. And there you have it! One power supply recycled to perform a needed health function, while providing the enjoyment of creating

another useful project. The total cost: \$2.90 for the "starting collar," plus the shelf paper (?), plus the paint (?), plus the feet (\$.90), equals \$3.80. Add another \$7.00 or so for the flex tubing and you're up to about \$11.00. Your cost may vary depending on the power supply available for "recycling" and how "full" your junk box is. The paint and paper used were orts from previous projects; the paint sells for about five bucks and the paper is about two bucks a yard.

Alas, now it's back to the chore of "clean-up." Hey, I wonder what else is there that can be remolded into another project? 73

One Repeater to Go, Please!

continued from page 30

For the most portability I recommend carrying the box, a gel cell and a magnetic mount antenna. If you can access a building rooftop and set the antenna on a metal structure such as an air conditioner, you should significantly improve your coverage area. If you are lucky enough to have access to a vehicle at a high point you can use the vehicle as an antenna mount and the battery as your power source.

While FCC rules can be ignored when there is an immediate threat to life or property, disaster recovery does not qualify. In fact, it is even more important to follow the regulations as well as good amateur practice during rescue and recovery efforts. As such, it is not a good idea to set this repeater up and walk away. Without automatic or remote control and an identification method, this system needs to have a control operator. Besides, during disaster situations looters are known to steal anything not nailed down. I'd use a location close to the repeater as the command and control site and use the control operator for other duties as well.

While this is not the most exotic repeater you'll ever see, in a pinch it just might prove its worth. Besides, it's a quick and easy project that has some real-world applications. 73

Understanding the CWTHA

continued from page 32

4 to 10 dB. At the second resonance, the azimuth pattern is a figure eight. Efficiencies at first resonance are very low; they range from less than 1% for 20 turns to 1% for 10 turns.

Footnotes

1. J.F. Corum, Toroid antenna, U.S. patent 4,622,558, Nov. 11, 1986.

2. R.C. Hansen and R. Ridgley, Modes of contrawound toroidal helix antenna, *Microwave Opt Technol Lett* 23 (1999), 365-368.

3. M.A. Tilston and K.G. Balmain, On the suppression of asymmetric artifacts arising in an implementation of the thin-wire method of moments, *IEEE Trans Antennas Propagat* 38 (1990), 281-285.

4. T.S. McLean and F. Rahman, Small toroidal antennas, *Electron Lett* 14 (1978), 339-340.

5. R.C. Hansen, Superconducting antennas, *IEE Trans Aerosp Electron Syst* 26 (1990), 345-355.

Additional reference

R.C. Hansen, Fields of the contrawound helix antenna, *Trans. IEEE*, Vol. AP-49, August 2001, 1138-1141. 73

MFJ's 1899T

Portable Antenna

continued from page 35

well as the BNC. The MFJ-1899T is only available in the BNC version. I was informed that the BNC connector is really an RCA to BNC adapter. I found that with a little persuasion, the BNC adapter could be removed and replaced with an RCA to PL-259 adapter (Radio Shack catalog #910-0700). The friction fit of the connectors is good and solid.

Final thoughts

The MFJ-1899T is a good all-band antenna for portable/remote operation with any low power portable rig under 25 watts of power. It qualifies as portable, lightweight, easy to assemble, and easy to change bands with. And the fact that it works great helps a lot!

For more information on ordering the MFJ-1899T (\$129.95), contact MFJ, 300 Industrial Pk. Rd., Starkville, MS 39759; tel. (662) 323-5869; [http://www.mfjenterprises.com].

I would like to thank Joe NA1X for his involvement in this product evaluation. 73

QRP

continued from page 44

inductance coils that may be used to tailor the audio response of the radio. They won't fit the PC board, as their lead spacing is not the same as the original one. However, a small hunk of perfboard would be ideal to use.

A handful of Mylar capacitors would round up the parts needed. Although you could sit down and calculate the values needed for the components based on frequency, cut-and-try is a lot more fun.

If anyone decides to try to improve the overall operation of the HW-7, I hope he will share the results with the rest of us.

Some HW-7 fixes and improvements

With some HW-7 radios, you can improve the sensitivity by placing a small jumper wire across C6 on the foil side of the PC board. Then remove R1, a 100k resistor. If you don't see any improvement or the radio fails to operate, replace the resistor. Some HW-7s will improve, others won't.

If the audio seems down, replace R411, 10k, with a 1k resistor. Again, this fix will only show up in the first run of kits. Older HW-7s will more than likely have the values changed.

Service hints

The Colpitts oscillator operated on 3.5 to 3.6 MHz and doubles to 7.0 to 7.2 MHz for 40-meter operation. For 20- and 15-meter operation, the oscillator runs at 7.0 to 7.1 MHz, and doubled for 20 meters, 14.0 to 14.2 MHz, and tripled for 15 meters, 21.0 to 21.3 MHz.

The following are typical RF readings. Gate of Q3: approximately 1 volt RMS. Base of Q4: approximately 0.8 volt RMS. Collector of Q4: sine wave with harmonics. Base of Q5 in transmit: 1 to 2.5 volts RMS. Base of Q6 and Q7: 1.5 to 2.5 volts RMS. RF output across a 50-ohm load: should be approximately 10 volts RMS on all bands. Typical RF voltage readings at

the detector FET Q1 are 0.6 to 1 volt RMS nominal. Any injection appreciably less than 0.4 RMS will give a loss of sensitivity.

Next time we meet, I'll have some information about the upcoming Five Days In May program being held this coming spring at the Dayton Hamvention. FDM is sponsored by the QRP Amateur Radio International. It is held at the Ramada Inn just south of downtown Dayton. For the last several years, it's been sold out. I would suggest that if you plan on attending this year's FDM, you get your tickets early.

If you want more information before you see it here in print, then point your Web browser to [www.qrpamr.org]. There, you can access the latest information dealing with FDM. 73

THE DIGITAL PORT

continued from page 50

to learn. I will let you know how it goes as I progress. I have talked to hams who work with it and at least one who was using it with his rig.

The advantage? I am not sure if I can conclusively say this at this point in time, but it would be nice not to depend on the whims of Microsoft as to whether my tried-and-true programs will be outmoded by an operating system. Fascinating idea, to say the least.

That's about it for this month. If I have you thoroughly confused or you just plain have questions, give me a shout via [KB7NO@worldnet.att.net]. 73, Jack KB7NO. 73

NEVER SAY DIE

continued from page 8

by drilling ice cores in the ice pack with the North Greenland Ice-core Project (North GRIP)? Basically, there have been ice ages that lasted about 90,000 years, followed by warm periods which lasted 10,000 years. The bad news is that the present warm period started about 10,000 years ago. Even worse, the cores show that the transition took only a few years. They were very sudden.

The scientists don't know what's caused these sudden transitions, where in a few years the earth's temperature has risen and fallen by as much as 20 degrees. It could be due to volcanic activity warming the oceans. Or it could be due to variable solar activity.

Continued on page 61

Special DX Forecast

March is usually quite good for DXing on 15 and 20 meters, which typically improve as the month progresses.

As the weather warms up, decreasing MUFs will curtail activity on 10 meters while atmospheric noise suppresses traffic on 40 meters and above. Central Asia, India, and the west coast of Africa will all provide good opportunities to snag unique stations, but the Arctic and Antarctic will be the hot spots for those seeking rare QSLs since the morning and evening gray-lines will pass near those areas this month.

My solar activity charts show only a few periods when our ionosphere and geomagnetic field might become notably disrupted. Overall, expect a high daily flux level and low geomagnetic index to provide solid openings across the globe. The 10th to 15th looks like an unusually quiet stretch with excellent propagation conditions likely. Other good days include the 19th, 20th, 29th, and 30th. The 3rd through 7th and 21st through 25th look particularly poor however, so expect moderate to strong flares or CMEs followed by particle storms lasting up to 48 hours. The 15th, 26th, and 31st also show some potential for trouble, so expect mostly poor conditions on those days.

This month the annual SOHO symposium will be held in Switzerland. As always we can expect some new and interesting scientific data to be released regarding the sun. Of particular interest to us is new data regarding the current solar cycle. Another important topic this year will cover how changes in solar irradiance are influencing global climate. I'll be sure to relay the pertinent tidbits as I get them. SOHO stands for "Solar and Heliospheric Observatory" and is the high-orbit satellite that has been our primary solar observation platform since 1996. Be sure to check out the SOHO Web site at [http://sohowww.nascom.nasa.gov/].

73 and good hunting!

March 2002

| SUN | MON | TUE | WED | THU | FRI | SAT |
|--------|--------|--------|-------|--------|-------|--------|
| | | | | | 1 F-G | 2 F-G |
| 3 F-P | 4 P | 5 P | 6 F-P | 7 P | 8 F | 9 F-G |
| 10 G | 11 G | 12 G | 13 VG | 14 F-G | 15 P | 16 F-P |
| 17 F | 18 F-G | 19 G | 20 G | 21 F-P | 22 P | 23 F-P |
| 24 F-P | 25 F | 26 F-P | 27 F | 28 F-G | 29 G | 30 G |
| 31 F-P | | | | | | |

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| GMT: | 00 | 02 | 04 | 06 | 08 | 10 | 12 | 14 | 16 | 18 | 20 | 22 |
|-----------------|---------|---------|---------|---------|---------|----|---------|---------|---------|---------|---------|---------|
| Central America | (15-20) | (15-20) | (20-40) | x | x | x | (10) | (10) | (10-15) | 10 (17) | 10-15 | 12-20 |
| South America | (17-20) | (20-40) | (20-40) | (20-40) | x | x | x | (10) | (10) | (10-15) | 10-15 | 10 (20) |
| Western Europe | (20-40) | (30-40) | (30-40) | (40) | x | x | (15-20) | (10-20) | (10) 17 | 15-20 | (15) 20 | (20) |
| Southern Europe | (17-20) | (20-40) | (20) | (20) | x | x | x | x | (10) | 10 (15) | 12 (17) | (15-20) |
| Eastern Europe | x | (30-40) | (20-40) | (17-20) | (20) | x | x | (10-15) | (15) | (17-20) | (20) | (20) |
| Middle East | x | (20) | 20 | (20-40) | (40) | x | x | x | (10-15) | 15 | (17-20) | (20) |
| India | (17-20) | x | x | x | x | x | x | (15-17) | x | x | x | x |
| Pakistan | (17-20) | (20) | x | x | x | x | x | x | x | x | x | (15) |
| Far East | (17-20) | (20) | x | x | x | x | x | x | x | x | x | (15) |
| Southeast Asia | (17-20) | x | x | x | x | x | (17-20) | (10-15) | x | x | x | x |
| Australia | (15) | (17-20) | x | x | x | x | (20-40) | (20) | (10) | x | x | x |
| Alaska | (15-20) | (20) | (20-30) | (30-40) | (40) | x | x | x | (15-20) | (10-20) | (10) 17 | 15-20 |
| Hawaii | (15) 20 | 20 | (20-40) | (20-40) | (40) | x | x | x | (15-20) | (10-20) | (10-20) | 15-20 |
| Western USA | 15-20 | (20-40) | (20-40) | (20-40) | (30-40) | x | x | (10-20) | 10 (20) | 10 (20) | 10 (20) | (15) 20 |

CENTRAL UNITED STATES TO:

| GMT: | 00 | 02 | 04 | 06 | 08 | 10 | 12 | 14 | 16 | 18 | 20 | 22 |
|-----------------|---------|---------|---------|---------|---------|------|---------|---------|---------|---------|---------|---------|
| Central America | (15-20) | (20-40) | (20-40) | (20-40) | (20-40) | x | (10-20) | 10-20 | 10-20 | 10 (20) | 10 (20) | 10-20 |
| South America | (15) 20 | 17-30 | (20-40) | (20-40) | x | x | x | (10-20) | 10 (20) | 10 (15) | 10 (20) | 12 (20) |
| Western Europe | (20) | (40) | (40) | x | x | x | x | (15) | (15-17) | (15-20) | (17-20) | (20) |
| Southern Europe | 20 | (20) | (20) | (20) | x | x | x | x | (10) | (10-15) | (10-17) | (15-20) |
| Eastern Europe | (20) | (20) | x | x | x | x | x | (15) | (15-17) | (17-20) | (20) | (20) |
| Middle East | x | x | x | x | x | x | x | x | (15) | (15) | (20) | (20) |
| India | (17-20) | (15-20) | x | x | x | x | x | (15-20) | x | x | x | x |
| Pakistan | (17-20) | (15-20) | x | x | x | x | x | (15-20) | x | x | x | x |
| Far East | (17-20) | (20) | x | x | x | x | x | x | x | x | x | (15) |
| Southeast Asia | (15-20) | x | x | x | x | x | x | (20) | (10-20) | x | x | x |
| Australia | (15-20) | (20) | x | x | x | x | x | (15-20) | (15-20) | 15 | 15 | 15 (20) |
| Alaska | 15-20 | (15) 20 | 20 | (20-30) | (30-40) | (40) | x | x | x | (10-20) | 10-20 | 10 (20) |
| Hawaii | 15-20 | (15) 20 | (20-40) | (20-40) | (40) | x | x | x | x | (10) 12 | 10-15 | (10) 17 |

WESTERN UNITED STATES TO:

| GMT: | 00 | 02 | 04 | 06 | 08 | 10 | 12 | 14 | 16 | 18 | 20 | 22 |
|-----------------|---------|---------|---------|---------|---------|---------|------|---------|---------|---------|---------|---------|
| Central America | 10-20 | 15-20 | 15-30 | (14) 40 | 20-40 | (30-40) | x | (15-20) | 10 (20) | 10 (20) | 10 (20) | 10 (20) |
| South America | (10) 20 | (15) 20 | (20-40) | (20-40) | x | x | x | (10-20) | 10 (20) | (10-15) | 10 (15) | 10 (20) |
| Western Europe | x | x | x | x | x | x | x | x | (15-17) | (15-17) | (17-20) | (17-20) |
| Southern Europe | (20) | (20) | (20) | (20) | (20) | x | x | x | (10-12) | (12) 17 | (15-20) | |
| Eastern Europe | x | x | x | (17-20) | (17-20) | x | x | (15) | (15) | (15-17) | (17-20) | (20) |
| Middle East | x | (20) | (20) | x | x | x | x | x | (15-17) | (20) | (20) | (20) |
| India | x | (17-20) | x | x | x | x | x | x | (15-17) | x | x | x |
| Pakistan | x | (17-20) | x | x | x | x | x | x | (15-17) | x | x | x |
| Far East | 10-20 | (20) | x | x | x | (40) | (40) | x | x | x | x | (10-20) |
| Southeast Asia | (10-15) | (10-15) | x | x | x | x | x | x | x | (15-20) | (15-20) | (10-15) |
| Australia | (10-15) | (15) | (17-20) | x | x | x | x | x | (15) 20 | (15-20) | (15) | (10) |
| Alaska | (10) 20 | (15) 20 | (20-40) | (20-40) | (30-40) | (40) | (40) | (40) | x | (10-15) | 10-15 | 10-20 |
| Hawaii | (15) 20 | 20 | (20-40) | (20-40) | (30-40) | (40) | x | x | x | (10-20) | (10) 20 | 15-20 |
| Western USA | 15-20 | (20-40) | (20-40) | (20-40) | (30-40) | (40) | x | x | (10-20) | 10 (20) | 10 (20) | (15) 20 |

Table 1. Band, time, country chart. Plain numerals indicate bands which should be workable on Fair to Good (F-G) and Good (G) days. Numbers in parentheses indicate bands usually workable on Good (G) days only. Dual numbers indicate that the intervening bands should also be usable. When one number appears in parentheses, that end of the range will probably be open on Good (G) days only.

Special DX Forecast

March is usually quite good for DXing on 15 and 20 meters, which typically improve as the month progresses.

As the weather warms up, decreasing MUFs will curtail activity on 10 meters while atmospheric noise suppresses traffic on 40 meters and above. Central Asia, India, and the west coast of Africa will all provide good opportunities to snag unique stations, but the Arctic and Antarctic will be the hot spots for those seeking rare QSLs since the morning and evening gray-lines will pass near those areas this month.

My solar activity charts show only a few periods when our ionosphere and geomagnetic field might become notably disrupted. Overall, expect a high daily flux level and low geomagnetic index to provide solid openings across the globe. The 10th to 15th looks like an unusually quiet stretch with excellent propagation conditions likely. Other good days include the 19th, 20th, 29th, and 30th. The 3rd through 7th and 21st through 25th look particularly poor however, so expect moderate to strong flares or CMEs followed by particle storms lasting up to 48 hours. The 15th, 26th, and 31st also show some potential for trouble, so expect mostly poor conditions on those days.

This month the annual SOHO symposium will be held in Switzerland. As always we can expect some new and interesting scientific data to be released regarding the sun. Of particular interest to us is new data regarding the current solar cycle. Another important topic this year will cover how changes in solar irradiance are influencing global climate. I'll be sure to relay the pertinent tidbits as I get them. SOHO stands for "Solar and Heliospheric Observatory" and is the high-orbit satellite that has been our primary solar observation platform since 1996. Be sure to check out the SOHO Web site at [<http://sohowww.nascom.nasa.gov/>].

73 and good hunting!

| March 2002 | | | | | | |
|------------|--------|--------|-------|--------|-------|--------|
| SUN | MON | TUE | WED | THU | FRI | SAT |
| | | | | | 1 F-G | 2 F-G |
| 3 F-P | 4 P | 5 P | 6 F-P | 7 P | 8 F | 9 F-G |
| 10 G | 11 G | 12 G | 13 VG | 14 F-G | 15 P | 16 F-P |
| 17 F | 18 F-G | 19 G | 20 G | 21 F-P | 22 P | 23 F-P |
| 24 F-P | 25 F | 26 F-P | 27 F | 28 F-G | 29 G | 30 G |
| 31 F-P | | | | | | |

| EASTERN UNITED STATES TO: | | | | | | | | | | | | | |
|---------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----|
| Country | 15 | 20 | 40 | 60 | 80 | 100 | 120 | 160 | 170 | 180 | 200 | 220 | 240 |
| Central America | (15) 20 | (15) 20 | 20 (40) | x | x | x | (10) | (10) | (10-15) | 10 (17) | 10-15 | 12-20 | |
| South America | (17) 20 | 20 (40) | 20 (40) | (20-40) | x | x | x | (10) | (10) | (10-15) | 10-15 | 10 (20) | |
| Western Europe | (20-40) | (30-40) | (30-40) | (40) | x | x | (15-20) | (10-20) | (10) 17 | 15-20 | (15) 20 | (20) | |
| Southern Africa | (17) 20 | (20-40) | (20) | (20) | x | x | x | x | (10) | 10 (15) | 12 (17) | (15-20) | |
| Eastern Europe | x | (30-40) | (20-40) | (17-20) | (20) | x | x | (10-15) | (15) | (17-20) | (20) | (20) | |
| Middle East | x | (20) | 20 | (20-40) | (40) | x | x | x | (10-15) | 15 | (17-20) | (20) | |
| India/Pakistan | (17-20) | x | x | x | x | x | x | (15-17) | x | x | x | x | |
| Far East/Japan | (17-20) | (20) | x | x | x | x | x | x | x | x | x | (15) | |
| Southeast Asia | (17-20) | x | x | x | x | x | (17-20) | (10-15) | x | x | x | x | |
| Australia | (15) | (17-20) | x | x | x | x | (20-40) | (20) | (10) | x | x | x | |
| Alaska | (15) 20 | (20) | (20-30) | (30-40) | (40) | x | x | (15-20) | (10-20) | (10) 17 | 15-20 | | |
| Hawaii | (15) 20 | 20 | (20-40) | (20-40) | (40) | x | x | (15-20) | (10-20) | (10-20) | 15-20 | | |
| Western USA | 15-20 | 20 (40) | 20 (40) | (20) 40 | (30-40) | x | x | (10-20) | 10 (20) | 10 (20) | 10 (20) | (15) 20 | |
| CENTRAL UNITED STATES TO: | | | | | | | | | | | | | |
| Country | 15 | 20 | 40 | 60 | 80 | 100 | 120 | 160 | 170 | 180 | 200 | 220 | 240 |
| Central America | (15-20) | 20 (40) | 20-40 | 20-40 | (20-40) | x | (10-20) | 10-20 | 10 (20) | 10 (20) | 10 (20) | 10-20 | |
| South America | (15) 20 | 17-30 | 20 (40) | 20 (40) | x | x | x | (10-20) | 10 (20) | 10 (15) | (10-20) | 12 (20) | |
| Western Europe | (20) | (40) | (40) | x | x | x | x | (15) | (15-17) | (15-20) | (17-20) | (20) | |
| Southern Africa | 20 | (20) | (20) | (20) | x | x | x | (10) | (10-15) | (10-17) | (15-20) | | |
| Eastern Europe | (20) | (20) | x | x | x | x | x | (15) | (15-17) | (17-20) | (20) | (20) | |
| Middle East | x | x | x | x | x | x | x | (15) | (15) | (17) | (20) | (20) | |
| India/Pakistan | (17-20) | (15-20) | x | x | x | x | x | (15-20) | x | x | x | x | |
| Far East/Japan | (17-20) | (20) | x | x | x | x | x | x | x | x | x | (15) | |
| Southeast Asia | (15-20) | x | x | x | x | x | x | (20) | (10-20) | x | x | x | |
| Australia | (15-20) | (20) | x | x | x | x | x | (15-20) | (15-20) | 15 | 15 | 15 (20) | |
| Alaska | 15-20 | (15) 20 | 20 | 20 (30) | (30-40) | (40) | x | x | x | (10-20) | 10-20 | 10 (20) | |
| Hawaii | 15-20 | (15) 20 | 20 (40) | (20) 40 | (30-40) | (40) | x | x | x | (10) 12 | 10-15 | (10) 17 | |
| WESTERN UNITED STATES TO: | | | | | | | | | | | | | |
| Country | 10-20 | 15-20 | 15-30 | (14) 40 | 20-40 | (30-40) | x | (15-20) | 10 (20) | 10 (20) | 10 (20) | 10 (20) | |
| Central America | (10-20) | (15) 20 | 20 (40) | 20 (40) | x | x | x | (10-20) | 10 (20) | (10-15) | 10 (15) | 10 (20) | |
| South America | x | x | x | x | x | x | x | (15-17) | (15-17) | (17-20) | (17-20) | (17-20) | |
| Western Europe | x | x | x | x | x | x | x | (15-17) | (15-17) | (17-20) | (17-20) | (17-20) | |
| Southern Africa | (20) | (20) | (20) | (20) | (20) | x | x | x | x | (10-12) | (12) 17 | (15-20) | |
| Eastern Europe | x | x | x | (17-20) | (17-20) | x | x | (15) | (15) | (15-17) | (17-20) | (20) | |
| Middle East | x | (20) | (20) | x | x | x | x | (15-17) | (20) | (20) | (20) | (20) | |
| India/Pakistan | x | (17-20) | x | x | x | x | x | (15-17) | x | x | x | x | |
| Far East/Japan | 10-20 | (20) | x | x | x | (40) | (40) | x | x | x | x | (10-20) | |
| Southeast Asia | (10-15) | (10-15) | x | x | x | x | x | x | x | (15-20) | (15-20) | (10-15) | |
| Australia | (10-15) | (15) | (17-20) | x | x | x | x | (15) 20 | (15-20) | (15) | (10) | | |
| Alaska | (10) 20 | (15) 20 | 20 (40) | (20) 40 | (30-40) | (40) | (40) | (40) | x | (10-15) | 10-15 | 10-20 | |
| Hawaii | (15) 20 | 20 | (20-40) | (20) 40 | (30-40) | (40) | x | x | x | (10-20) | (10) 20 | 15-20 | |
| Eastern USA | 15-20 | 20 (40) | 20 (40) | (20) 40 | (30-40) | (40) | x | (10-20) | 10 (20) | 10 (20) | 10 (20) | (15) 20 | |

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Band-by-Band Summary

10-12 Meters

As always, these are daytime-only bands with openings generally following the path of the sun from sunrise to sunset. Look for strong signals from stations in Western Europe, Japan, or Korea. Expect both 10 and 12 meters to worsen toward the end of the month as Maximum Usable Frequencies (MUFs) Short-skip distances will usually fall between 1,000 to 2,500 miles.

15-17 Meters

Should be quite good as daytime bands and should even stay open for awhile for stations located in the southern U.S. Expect signals to peak toward the east in the morning, to the south around midday, and to the west later in the afternoon. Short-skip is expected to be about 1,000 miles.

20 Meters

As usual, this will be your best overall band and should provide the most hours of good DXing. Expect openings to begin after sunrise and last well into the evening. Your more exotic contacts will probably occur between sunset and midnight as day begins in Central Asia and the Indian Ocean. Try both polar paths for a shot into Afghanistan and Pakistan. Short-skip will vary widely between 500 and 2,500 miles.

30-40 Meters

30 and 40 meters will be best for DXing from late evening until sunrise. Activity on these bands is sure to taper off as warm weather arrives and atmospheric noise increases. Africa, the Middle East, and Asia are good hunting grounds for some of your rarer opportunities, but Central and South America will tend to dominate prime-time hours. Short-skip will be less than 1,000 miles during the day and greater than 750 miles at night.

80-160 Meters

These bands will certainly begin deteriorating early in the month as springtime storms begin brewing in the subtropics. However, they're still worth checking out, especially if 40 meters is active. Short-skip on 80 will be over 2,000 miles at night and around 300-400 miles during the day. Short-skip on 160 meters will average between 1,000 and 2,000 miles at night.

Say you saw it in 73!

NEVER SAY DIE

continued from page 59

We're experiencing unexplainable solar activity right now, with the first double maximum of sunspots in history. The Sun is acting up and we have no clue yet what that might do to our climate.

Have you read *Not By Fire, But By Ice* by Robert Felix? Have you yet read Chet Snow's *Mass Dreams of the Future*? They're in my *Wisdom Guide*.

With about 80% of humans living within 40 miles of an ocean, mile-high sloshing of the oceans from a sudden pole shift could easily wipe most of us out.

And that brings up the third event you can worry about. If the Pacific Ocean, which is being heated by thousands of new undersea volcanoes, warms the western Antarctic ice shelf enough, a huge section of the ice cap could suddenly slide off into the ocean, creating a wave traveling at around 500 mph and a thousand or two feet high, going all the way to the North Pole. What few people who manage to survive this would be without power, food, or heat. Permanently back on foot again. There will be little warning since it would take a tsunami only about 15 hours to reach Los Angeles — barely enough time to get through baggage inspection at the airport.

While the calving off of the ice from the western Antarctic ice shelf has been spectacular, that was already floating ice, so it hasn't affected the average sea level. But sliding a whopping ice cube into the sea could raise the sea level over a hundred feet. Good-bye coastal cities. Well, I'm glad I'm living 1,000 feet above sea level.

Global Warming

If you believe all that BS about global warming, you probably also believe that NASA put a man on the Moon. Yeah, we've been Gored by tons of propaganda, and the hand-wringing over the Kyoto Treaty, which our rotten American government won't sign.

The world is getting colder. The animals know it. The birds know it. The trees know it. How come we're the last to get the message?

A 90-year-old Vermonter says that during his first 75 years he recalls only one moose sighting. Now moose sightings in Vermont are common. The moose know it's getting colder.

Arctic nesting birds such as the snowy owl and northern diver have returned to the British Isles after leaving a hundred years ago. They've even been seen in Washington. The number of geese wintering in Washington and Oregon has

increased 500% in the last 25 years. The birds know it's getting colder.

115,000 years ago, the climate went from warm like we have today to glaciers in less than 20 years, wiping out the elm and oak trees. Today elms in New England are dying.

In 1960, all of Tennessee was in the USDA hardiness zone 7. Today, three quarters of the state is in hardiness 6. The plants know it's growing colder.

Glaciers Melting

The glaciers in Norway, Sweden, Ecuador, Canada, Switzerland, and the United States are growing. The Nisqually Glacier in Washington has been growing thicker by 18 feet a year as measured by geologist Jack Sauer, a 73 reader.

But what about the rising oceans? And those huge blocks of ice breaking off from Antarctica as reported in *Time*? Measurements at Pacific islands show that the oceans have gone down a few inches over the last ten years.

Land and atmospheric temperatures have been going down, while ocean temperatures have been going up. Hmm, what's going on here?

Ten years ago, scientists counted about 10,000 undersea volcanoes. Now NASA's Web site estimates there are as many as one million volcanoes under water.

Vermont had the most snow and the longest winter in recorded history last year. Mongolia had ten times the normal amount of snow last winter.

The Ice Cap Meltdown

In 1942 six P-38s and two B-17s were forced down by a blinding storm in Greenland. The 25 crewmen made it back safely nine days later. The planes were abandoned. Forty years later, with P-38s now collector's items, 12 expeditions have tried to recover one of those planes. One was finally found, but instead of being about 40 feet down, based on satellite measurements, they had to melt a tunnel down 268 feet to the plane. So much for the ice caps melting.

The Drug War

Having learned nothing from the Prohibition disaster, which gave us the Mafia and organized crime but had no effect on the availability of liquor, we launched the "War on Drugs." This super debacle, which was recently chronicled on PBS for the disaster it has been, hasn't made any significant impact on drug use. Drugs are available anywhere, and are cheaper than ever. It has poured billions into the economies of Colombia and Mexico, and more than doubled our prison population — at a housing cost of

about \$30 billion out of our taxpaying pockets.

The illegal drug industry is doing great, and the kingpins will spend what it takes to ensure that Congress doesn't make a move to legalize drugs.

Ending Prohibition almost immediately cleaned up the liquor industry, forcing organized crime to turn to gambling and the development of Las Vegas casinos.

It's the fantastic profits that selling drugs provides that has resulted in over a million more Americans being put in prison. It's also made it very profitable for customs agents and police. The corruption in Mexico went right up to the president.

I won't go into my proposal for legalizing drugs — I've detailed it in my past essays — but I'd much prefer to see the hundreds of billions of profits going into state and federal treasuries so legislatures and Congress would have more money to spend on their pork and do-good (but invariably destructive) social projects. Congress has an enviable record of spending every dollar they can get their hands on. Or borrow. So have state legislatures.

Melanomas

These are the top cancer-related cause of death to 25–30-year-old Americans. Alas, the drug companies haven't yet been able to come up with a drug.

Hey, guys, it's weakened immune systems that are causing the trouble, not the sun — nor a lack of interferon alpha-2b or some other patented concoction. Our ancestors spent most of their days in the sun and they didn't get any melanomas.

According to Dr. Lorraine Day and several other reports I've read, when two groups of lab animals get the same amount of sun exposure, with one group eating the standard American diet and the other fed raw foods, only the American diet group gets melanomas. So, if you're going to nosh at McDonald's, stay the heck out of the sun. At least you'll have a better chance of living at least into your 50s before your diet-caused heart attack — probably preceded by a few \$25,000 bypass operations.

Days Inn

D'ja see their ads offering a free interactive kid's educational CD-ROM from Golden Books or Encore to anyone staying at their hotels? AAA members get two free CDs. Good promotion.

'Course, I dunno if the programs are any good. Please let me know if you've tried any of 'em on your kids, grandkids, or great-grandkids.

Lied To

Wait'll you read *You Are Being Lied To*, a whopping 9- x 12-inch book, and over one-inch thick (400 pages), subtitled: "The Disinformation Guide to Media Distortion, Historical White-washes, and Cultural Myths." If you are not already a social pariah for passing along my exposing of disinformation, this will finish the job. The editors have rounded up dozens of experts to debunk just about everything that you passionately believe in. Or, at least, that the major media believe in — which, sadly, is usually the same thing.

Do you believe that two youngsters did all that shooting at Columbine High? Do You believe that one truck bomb was all that was involved at Oklahoma City? And so it goes with the uncovering of one government-media cover-up after another — about text books, our schools, the Big Bang, Alcoholics Anonymous, Al Gore, John McCain, Columbus, and so on.

I infuriated many devout Christian readers when I published an essay about one chapter of this book which made a good case for Jesus being a myth. The author of that article does make a very good case, but I'd like to hear him debate the subject with other scholars such as Glen Kimball (*Hidden Stories of the Childhood of Jesus*).

It's such a huge book that it's going to take me a long time to read it all, but everything I've read so far has been fascinating. And those events that I've independently researched, I've found fairly covered.

The book is \$20 and published by The Disinformation Company, 419 Lafayette Street, New York NY 10003, ISBN 096641007-6, 2001, [www.disinfo.com].

I talked about the book on the Art Bell show and wiped out the inventory of almost every bookstore in the country, including Amazon.com.

Survival

By now you understand that our borders are almost wide open, allowing our enemies to come and go as they please. You know that hundreds of tons of drugs are being smuggled into the country, so bringing in explosives, suitcase nukes, or bioweapons is no problem. And you know that our national security system is ineffective, to put it politely.

You also know that there are a bunch of bad guys out there who are willing to spend what it takes, including their lives, to do us harm. Us, Americans. Any of us. All of us.

For a country with millions of people walking around with a cell phone to

their ears, we're pathetically vulnerable to our communications systems being clobbered.

So, as I've been writing, it's payback time for us ham operators. We've finally got the opportunity to be worth the billions of dollars in choice frequencies we've been allocated by forming a national emergency response system, with cells in every town in the country. Cells set up and working on a daily basis.

Most Likely

Hijacking the airliners surprised us, but only because we were fast asleep, and so was our \$30-billion-a-year national security staff. We ignored the alarm bell that went off a couple years ago when hijackers grabbed an Air France plane with the intention of using it to destroy the Eiffel Tower. A French security swat team killed the hijackers before they could take off.

Now that we've been rudely shaken awake it's going to be a lot tougher for the enemy to use our airliners as missiles. And that means the terrorist groups are going to do something else — the most likely being a germ warfare attack on several cities, all at once. I don't think Duncan Long was making it all up in his book, *Bioterrorism*, when he said that Saddam Hussein has over a thousand sleeper Iraqis here, preparing to dump tons of anthrax on us with the goal of killing about 200 million Americans in a week.

You aren't going to be providing any emergency communications if you're dead, so how can you improve the odds of your (and your family's) personal survival?

Well, how about getting gas masks and Tyvek protective suits? Two things. First, on September 12th every gas mask supplier in the country was cleaned out. Ditto protective suits. Masks went from \$17 to \$75, then to \$200. Okay, maybe when they get a new shipment, right? Wrong. The gas masks have mainly been Israeli army surplus. Israel is now trying to provide masks for their population and I understand they are 600,000 behind for them, so it's going to be a long time before there are any new gas masks arriving.

Unless you're going to go around wearing a mask 24/7, you'll probably be up to here in anthrax spores before you know it.

Does that mean we're all sitting ducks? Of course not. But, presuming that our inept national security forces are unable

Continued on page 64

Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

The Secret Guide to Health: Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some serious lifestyle changes. Will you be skiing the slopes of Aspen with me when you're 90 or doddering around a nursing home? Or pushing up daisies? No, I'm not selling any health products, but I can help you cure yourself of cancer, heart trouble, or any other illness. Get this new, 2001 expanded edition (156p). \$10 (#05)

The Secret Guide to Wealth: Just as with health, you'll find that you have been brainwashed by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. \$5 (#03)

The Secret Guide to Wisdom: This is a review of around a hundred books that will boggle your mind and help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait'll you see some of the gems you've missed reading. You'll have plenty of fascinating stuff to talk about on the air. \$5 (#02)

The Bioelectrifier Handbook: This explains how to build or buy (\$155) a little electrical gadget that can help clean your blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. It's working miracles! The circuit can be built for under \$20 from the instructions in the book. \$10 (#01)

My WWII Submarine Adventures: Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life aboard a submarine like? How about

the Amelia Earhart inside story? If you're near Mobile, please visit the Drum. \$5 (#10)

Wayne's Caribbean Adventures: My super budget travel stories — where I visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. \$5 (#12)

Cold Fusion Overview: This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. \$5 (#20)

Cold Fusion Journal: They laughed when I predicted the PC industry growth in 1975. PCs are now the third largest industry in the world. The cold fusion ground floor is still wide open, but then that might mean giving up watching ball games. Sample: \$10 (#22)

Julian Schwinger: A Nobel laureate's talk about cold fusion—confirming its validity. \$2 (#24)

Dowsing. Yes, dowsing really does work. I explain how and why it works, opening a huge new area for scientific research with profound effects for humanity. \$2 (#84)

Improving State Government: Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can be gotten to cut its expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy any taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. \$5 (#30)

Mankind's Extinction Predictions: If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out are right, we're in trouble. I explain the various disaster scenarios, like Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts — like Hapgood, Einstein, Snow, Noone, Felix, Strieber. \$5 (#31)

Moonoggle: After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the NASA videos, looked carefully at the photos, read the astronaut's biographies, and talked with readers who worked for

NASA. This book cites 45 good reasons I believe the whole Apollo program had to have been faked. \$5 (#32)

Classical Music Guide: A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is what you need to help you reduce stress. Classical music also raises youngster's IQs, helps plants grow faster, and will make you healthier. Just wait'll you hear some of Gotschalk's fabulous music! \$5 (#33)

The Radar Coverup: Is police radar dangerous? Ross Adey K6UL, a world authority, confirms the dangers of radio and magnetic fields, including our HTs and cell phones. \$3 (#34)

Three Gatto Talks: A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system — the least effective and most expensive in the world. \$5 (#35)

Aspartame: a.k.a. NutraSweet, the stuff in diet drinks, etc., can cause all kinds of serious health problems. Multiple sclerosis, for one. Read all about it, two pamphlets for a buck. (#38)

\$1 Million Sales Video: The secret of how you can generate an extra million dollars in sales just by using PR. This will be one of the best investments you or your business will ever make. \$40 (#52)

Reprints of My Editorials from 73. Very few things in this world are as we've been taught, and as they appear. I blow the whistle on the scams around us, such as the health care, our school system, our money, the drug war, a college education, sugar, the food giants, our unhealthy food, fluorides, EMFs, NutraSweet, etc.

1996 Editorials: 120 pages, 100 choice editorials. \$10 (#72)

1997 Editorials: 148 fun-packed pages, 216 editorials. \$10 (#74)

1998 Editorials: 168 pages that'll give you lots of controversial things to talk about on the air. \$10 (#75)

1999 Editorials: 132 pages of ideas, book reviews, health, education, and

anything else I think you ought to know about. \$10 (#76)

2000 Editorials: 76 pages (thinner magazine as a result of our slowly dying hobby) \$5 (#77)

Silver Wire: With two 5-in. pieces of heavy pure silver wire + three 9V batteries you can make a thousand dollars worth of silver colloid. What do you do with it? It does what the antibiotics do, but germs can't adapt to it. Use it to get rid of germs on food, for skin fungus, warts, and even to drink. Read some books on the uses of silver colloid, it's like magic. \$15 (#80)

Silver Colloid Reprint. April 97 article on a silver colloid maker, history, and how to use the stuff. \$5 (#98)

Colloid Kit. Three 9V battery clips, 2 alligator clips & instructions. \$5 (#99)

Wayne's Bell Saver Kit. The cable and instructions enabling you to inexpensively tape Art Bell W6OBB's nightly 5-hr radio talk show. \$5 (#83)

73 Writer's Guide: It's easy, fun, can pad your résumé, and impress the hell out of your friends. \$0 (#78)

Cold Fusion Six-Pack: Six Cold Fusion Journal back issues to bring you up to speed. \$20 (#19)

NASA Mooned America: René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. \$30 (#90)

Last Skeptic of Science: This is René's book where he debunks a bunch of accepted scientific beliefs — such as the ice ages, the Earth being a magnet, the Moon causing the tides, etc. \$30 (#91)

Dark Moon: 568 pages of carefully researched proof that the Apollo Moon landings were a hoax — a capping blow for René's skeptics. \$35 (#92)

Dark Moon Video: 222-minute exposé naming NASA with their own photos. If you've watched the NASA films of the astronauts walking on the Moon you wondered at their weird gait. Wait'll you see it speeded up. It looks exactly like they're running on Earth! They catch NASA in dozens of giveaways that the photos and films had to have been faked. \$46 (#93)

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Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

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NEVER SAY DIE

continued from page 62

to frustrate Saddam's or Osama bin Laden's terrorist cells, which seems likely, we're going to get hit.

The Answer

Back during WWI, when flu killed twenty million people — or earlier, when the Black Plague wiped out millions, and so on, there were always a few people who either didn't get sick at all, or quickly recovered. Miracles? No, just people with strong immune systems. But if you are busy putting poisons into your body and ridiculously mistreating it, your immune system won't even be able to fight off something as mild as a cold. I've been over the details too many times. If you've missed all that, you can get the full treatment in my \$10 *Secret Guide to Health*.

The basics are simple: Stop poisoning your body and give it the food and water it was designed — over a million or so years — to use for fuel.

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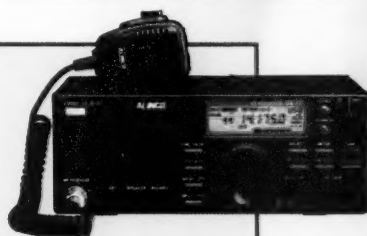


Alinco DX-70TH Base/Mobile/Portable HF + 6 Meter Transceiver

- 100 watts SSB, FM & CW, 40 watts AM
- Continuous coverage HF receiver + full 6 meter coverage
- 100 memory channels
- Speech compressor
- Great CW rig, full QSK, semi or automatic break-in
- Standard narrow filter fights QRM on SSB, CW or AM
- Two VFO's and easy "split" operation
- Removable face for remote mounting.
- RIT / TXIT, IF shift
- Multi function control for easy operation

Alinco DX-77T Desktop HF Transceiver

- 100 watts SSB, FM & CW, 40 watts AM
- General coverage receiver 150 KHz ~ 30 MHz
- Two VFO's; easy "split" operation
- Standard speech processor
- Front panel speaker provides loud, clear audio
- Built-in electronic keyer 6 ~ 60 wpm
- Full QSK, 7-step semi break-in or auto break-in
- Enhanced Direct Digital Synthesis (DDS) eliminates need for SSB Narrow Filter
- Front panel connections for mic, key, speaker & phones



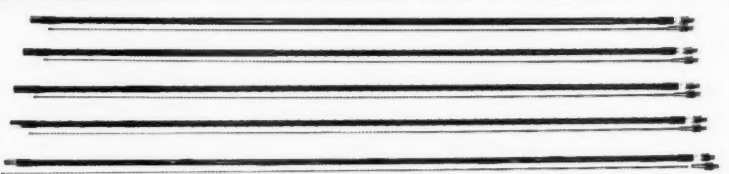
Options

- EDX-2 automatic wire antenna tuner
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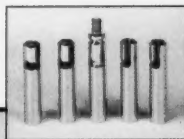


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■ Frequency Coverage: (RX) 100 kHz-30 MHz; (TX) 160-10 m Amateur Bands ■ Dual In-band Receive w/Separate "S" Meters ■ Ten Pole Collins® Mechanical Filter Built-in ■ RX DSP Noise Reduction and CW Peaking Filter ■ High-speed Automatic Antenna Tuner ■ Two TX/RX Antenna Jacks plus RX-only Jack ■ TX Microphone Equalizer ■ RF Speech Processor ■ Direct Digital Synthesis ■ CW Spot and Two Key Jacks ■ Two Headphone Jacks (1/4" and 3.5 mm) ■ Low-Level Transverter RF Drive Jack ■ Separate FP-29 Power Supply (30 V/13.8 V DC Output)



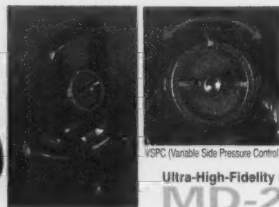
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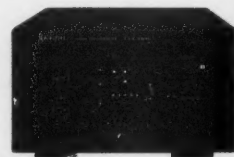
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200 W 50 MHz Transverter
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